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THE PHYSIOGNOMY OF THE INDIANS OF SOUTHERN NEW ENGLAND

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WITHIN the last thirty years a number of skulls of illustrious men have been submitted to anatomists, either to learn their special characteristics or to establish their identity. Thus the skull of Kant was studied by Kupffer and Bessel-Hagen in 1881, that of Raphael by Welcker in 1884, and that of Bach by His in 1895. The supposed skull of Schiller, long cherished at Weimar as genuine, was proven spurious by Welcker in 1882, and the real one was supposed to be lost until, within the last few months, it has come to light, and is now in possession of the anatomist August Froriep.[1] During this series of investigations the detailed relationships between the face of the skull and the fleshy face have become more and more definitely known, until it seems now possible, given either one, to reproduce the other with considerable accuracy. Thus far the study has been confined in the main to ascertaining the average thickness of the soft parts over certain definite points, and then covering the face of the skull with a layer of clay, or other plastic substance, carefully observing the proper measurements at each point. Although this method is confessedly incomplete, it was used with startling results in 1895 in building up the face upon the supposed skull of Bach, results that proved the identity of the

[1] Presented at the annual session of the Anatomische Gesellschaft at Munich in April last (1912). Cf. *Anat. Anz.*, May 13, 1912, for the preliminary report.

skull in question beyond all doubt. (Fig. 50.) Since then the method has been employed a few times, generally in somewhat fanciful cases. Thus Kollmann has reconstructed the face of a Neolithic woman from the lake-village site of Auvernier, Lake Neuchâtel, and Merkel has built up the bust of an early Low-Saxon from an ancient skull, found by excavation in the vicinity of Göttingen.

FIG. 50.—Reconstruction of the face of Johann Sebastian Bach; built directly upon the skull by the sculptor Seffner in accordance with the measurements taken by Professor His. (After His, 1895.)

Still, in spite of the real interest in the results, the data for such a reconstruction are not yet complete, and for certain of the soft features, notably the fleshy part of the nose, the lips, and the surroundings of the eyes, there is still much to be done. It is not impossible that even in these details there may be definite correlations between the bony structures and the soft parts, which later research will reveal, and that indications of these exist upon the face of the skull, if they could only be read. For the nose, at least a good beginning of this was made by Welcker in his discussion of the supposed Schiller skull,[1] but there is still much to be done in this direction.

[1] Welcker, *Schiller's Schädel und Todtenmaske*, Braunschweig, 1883, esp. pp. 84–93.

Regarding the general thickness of the soft parts of the face, not connected with the special features, Welcker established the average thickness at nine definite median points, obtaining his data from thirteen male bodies of middle age by means of a small, double-edged knife with a chisel-shaped end. He first ascertained with accuracy the total length of the blade of this instrument, then, at each of the determined points, thrust it perpendicularly through the soft parts until it came to the bone, and measured the part of the knife-blade still remaining. The points taken, with the average thickness at each, are given in the first column of the subjoined table.

Wilhelm His, in 1895, during his investigation of the Bach skull, made further studies in the thickness of the soft parts, using a larger number of bodies, including females, and establishing several lateral points.

To obtain his measurements he abandoned the thin blade employed by Welcker in favor of a sewing needle, set in a handle and bearing a small rubber disk. The needle was oiled and thrust into the flesh perpendicular to the surface, the disk registering the thickness. After withdrawal, the part below the disk could be measured with a millimeter rule.

His first showed the difference in the thickness of the soft parts in bodies of various conditions, and compared the data obtained from 24 male suicides, who were in sound bodily condition, with those from 9 males who had died of wasting disease. His results from the sound bodies in the case of each sex separately are shown in the second and third columns of the table here given.

Still more material was furnished by Kollmann and Büchly three years later, apropos of the reconstruction of the face of the Neolithic female skull aforesaid. These investigators studied the bodies of 21 males and 7 females in various bodily conditions, and added three points to those employed by His; namely, the free edge of the nasal bones (rhinion), previously used by Welcker; the highest point upon the surface of the jugal bone; and the middle of the zygoma. The averages of these 21 males and of the four well-nourished females are given in the table here presented (columns

TABLE SHOWING THE MEASUREMENTS OF THE SOFT PARTS OF THE FACE, ACCORDING TO DIFFERENT AUTHORS, AND IN THE DIFFERENT SEXES AND RACES

Column 1, Welcker, 1883; averages of 13 males. Column 2, His, 1895; averages of 24 male suicides between the ages of 17 and 72. Column 3, His, 1895; averages of 4 female suicides. Column 4, Kollmann, 1898; averages of 21 males. Column 5, Kollmann, 1898; averages of the 24 males of His with the 21 males of Kollmann: 45 in all. Column 6, Kollmann, 1898; averages of four well-nourished females. Column 7, Kollmann, 1898; averages of the four female suicides of His with the four females of Kollmann: 8 in all. Column 8; Birkner, 1903–1907; averages of 6 male Chinese, beheaded. Column 9, Fischer, 1905; averages of two male Papuans. Column 10, von Eggeling: 1909; averages of three male Hereros. Columns 11 and 12, the figures used in the reconstructions given in this paper: New England Indians and others—column 11 for males, column 12 for females. In columns 8, 9, and 10, the black-faced figures are those which are markedly different from the European averages.

		Location of Point	1	2	3	4	5	6	7	8	9	10	11	12
Median	o	Occipital; midway between lambda and rhinion	6.8	—	—	—	—	—	—	—	—	—	—	—
	p	Middle of parietal region	5.3	—	—	—	—	—	—	—	—	—	—	—
	St_1	Forehead; line of hair	—	4.08	4.16	3.07	3.56	3.02	3.59	4.24	3.55	3.93	3.6	3.6
	f	Forehead; middle	4.3	—	—	—	—	—	—	—	—	—	—	—
	St_2	Forehead; glabella	—	5.17	4.75	4.29	4.69	3.9	4.32	5.45	4.1	5.36	4.7	4.3
	Nw	Nasion	5.9	5.45	5.0	4.31	4.93	4.1	4.55	**6.6**	**2.95**	4.76	4.9	4.5
	Nr	Middle of internasal suture	3.3	3.29	3.0	3.13	3.25	2.51	2.78	**5.43**	2.45	3.76	3.25	2.8
	Ns	Rhinion; free end of nasals	2.2	—	—	2.12	2.12	2.07	2.07	2.38	2.9	**3.43**	2.1	2.0
	Ow	Akanthion; base of upper lip at septum	—	11.25	9.75	11.65	11.59	10.1	9.92	11.2	9.6	12.16	11.6	9.9
	lg	Prosthion; middle of hollow in upper lip	11.0	9.37	8.26	9.46	9.48	8.1	8.18	11.65	9.8	**13.63**	9.5	8.2
	K_1	Transverse furrow of chin at base of lower lip	10.6	10.0	9.75	9.84	10.05	10.95	10.35	11.02	9.15	10.46	10.0	10.4
	K_2	Gnathion; point of chin, directed forward	8.5	11.05	10.75	9.02	10.22	9.37	10.06	10.95	9.1	9.8	10.2	10.0
	K_3	Beneath chin, directed downward	—	6.16	6.5	5.98	6.08	5.85	6.18	6.07	5.65	5.26	6.0	6.2
Lateral	oa	Middle of eyebrow, or superciliary ridge	—	5.8	5.5	5.41	5.65	5.15	5.32	**6.63**	5.05	**6.85**	5.6	5.3
	ua	Middle of lower rim of orbit	—	4.9	5.25	3.51	4.29	3.65	4.45	5.52	5.15	**5.65**	4.3	4.5
	wb	Middle of jugal bone, highest point	—	—	—	6.62	6.62	7.73	7.73	**10.0**	**4.9**	7.31	6.6	7.7
	jb_1	Middle of zygomatic arch	—	—	—	4.33	4.33	5.32	5.32	**5.77**	**8.05**	4.46	4.3	5.3
	jb_2	Base of zygomatic arch, near ear	—	6.05	6.75	7.42	6.74	7.1	6.92	**8.59**	7.4	**11.03**	6.7	7.0
	Uk	Side of mandible, in front of masseter	—	8.37	8.1	7.76	8.20	6.16	7.13	7.08	**10.1**	9.68	8.2	7.2
	Ms	Middle of ramus, through masseter	—	17.55	17.0	17.01	17.53	14.83	15.91	**20.05**	**20.5**	18.63	17.5+	16+
	Kw	Gonion; angle of jaw	—	12.08	11.5	8.72	10.46	7.56	9.53	11.73	**17.5**	13.61	10.5	9.6

4 and 6). Furthermore, these authors, in addition to their own data, added the 24 normal male individuals measured by His, and thus obtained a combined average of 45 normal male individuals (column 5 of the table). For females the data are still meager, but Kollmann and Büchly again combined the results from their four well-nourished female bodies with those from the four female suicides of His, and obtained a combined average of the data from 8 individuals (column 7).

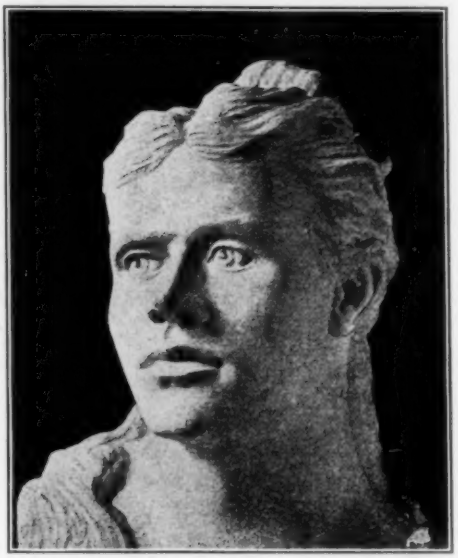


FIG. 51.—Face of a Neolithic Swiss woman from the lake-village site of Auvernier, on Lake Neuchâtel. Built directly upon the skull by Kollmann and Büchly, 1898. (After Kollmann.)

For obtaining their measurements these authors employed a needle, as did His, but instead of using the rubber disk, they blackened the needle with soot from a candle flame before each application. Contact with the flesh rubbed off the soot, and after withdrawal the soot-free part was measured.

The final result of these investigations, here reproduced (fig. 51), is very pleasing, and represents a young woman of rather masculine type, with a markedly Swiss countenance: a good model for a statue of Helvetia.

A second attempt to recall the past, but one not so distant, through plastic reconstruction, was made by Merkel in 1900, who, with the assistance of the sculptor Eichler, built a face upon the skull of an ancient Saxon, found in the neighborhood of Göttingen,

and estimated to be between 1200 and 1400 years old. This work, however, differed in method from the preceding, for Merkel often departed widely from the prescribed data, following rather his own deductions concerning the development of muscles and other parts, as suggested by the lines and features of the skull; yet again, as with Kollmann, the result was extremely pleasing although it cannot well be tested (fig. 52). Upon looking at these striking and very effective results one cannot help thinking of the influence of the professional sculptor who performed the plastic part of the work in each case, and the feeling is strong that much that is satisfying in the result may be due to the skill of the artist, although without any conscious attempt on his part to express an ideal.

FIG. 52.—Bust of a Low-Saxon of 500–700 A.D.; built upon a skull from the Leinegau district of Germany, near Göttingen, by Merkel, 1910. (From Eggeling, after Merkel.)

In the direction of racial measurements Birkner, in 1903–1905, measured carefully the heads of six beheaded Chinese, and came to the result that in racial anatomy the soft parts vary more than the skulls, and that the racial differences in the thickness of soft parts are very considerable. Fischer, in 1903, measured the soft parts

of two Papuans, and von Eggeling, in 1909, studied in the same way the heads of four Hereros. The results of these (Chinese, Papuans, Hereros), although they include only a very few individuals, are here added for comparison with the others (columns 8, 9, and 10), and serve to emphasize Birkner's conclusions. Von Eggeling, from whom these last figures are taken, calls attention to the most striking departures from European averages by the use of heavy type, and this method is here reproduced. Thus one sees at once that in the Chinese the base of the bony nose, at the fronto-nasal suture, is sunk much deeper in the flesh, and in the Papuans it is more superficial, than in Europeans; also the traditional thickness of lip in the negro is shown by the thickness at the prosthion in the Herero. In the lateral points there is a greater thickness of flesh over the superciliary ridges in both Chinese and Herero, while in the surroundings of the eye the Papuans are about the same as Europeans. Other marked points of difference are in the cheeks of the Chinese, and in the masseteric region of all three races, where the measurements considerably exceed those of Europeans.

These last three investigators, Birkner, Fischer, and von Eggeling, employed in their work the soot-covered needle of Kollmann, but for this purpose a special instrument has recently been prepared by Czekanowski (1907), consisting of a needle that slides in a brass tube. In this latter is a graduated slot. This indicates the extent of projection of the needle beyond the lower edge of the brass tube, which is disk-shaped and lies flat upon the surface of the skin.

Interested now for several years in these European attempts at reconstructing faces upon skulls, I determined to apply the methods to the skulls of New England Indians, in a region where the extermination of this race has been so complete that no living representatives are now left except two or three small communities where intermarriage with other races, especially Negroes, has been long continued (e. g., Gay Head, Mass; Charlestown, R. I.).

For data I took, in general, those of Europeans, reducing the figures, however, to a single decimal, as a figure in the hundredths place can have no meaning in practical application. Thus reduced, the figures for the two sexes, as used by me, are indicated in the two last columns of the table (columns 11 and 12).

Since, however, a few striking racial differences are to be expected, I allowed the general contours and proportions of the skulls used to effect a few modifications when the indications seemed to demand it. Thus, through the masseter, where the average Euro-

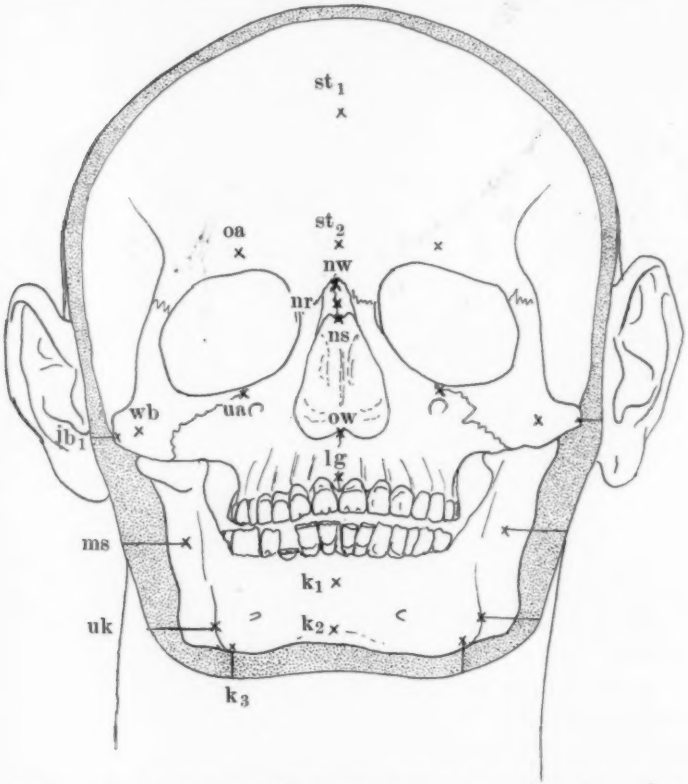


FIG. 53.—Location of the established points upon the face; front view. (After Kollmann and Büchly.)

pean measurement of 16–17 mm. gave the region a hollow appearance, I increased the thickness to 20 or even more, using as an indication the zygomatic arch and the configuration of the area of

insertion of this muscle upon the mandible. In most respects, however, I adhered closely to the European data.

Regarding the plastic material, and the methods of application,

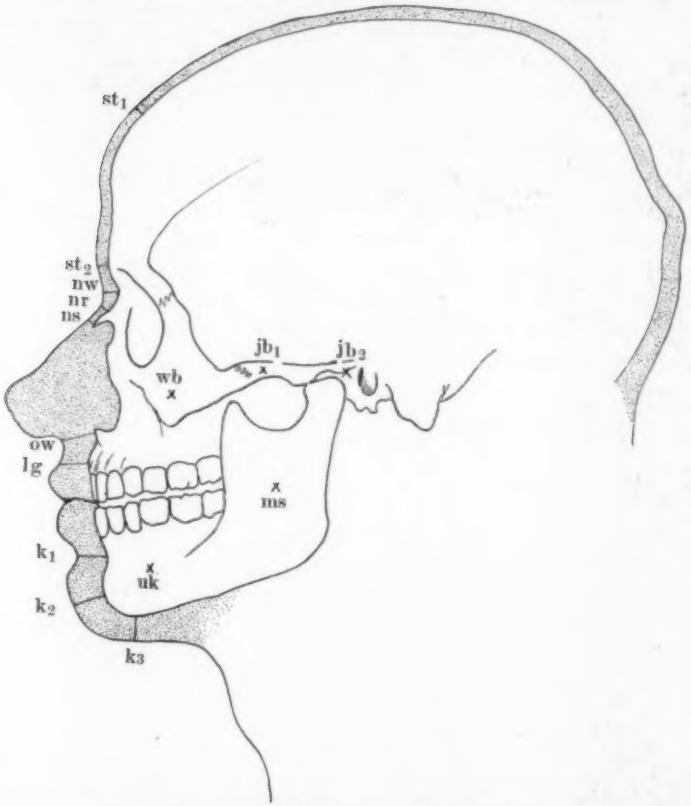


FIG. 54.—Location of the established points upon the face; side view. (After Kollmann and Büchly.)

His and Kollmann used clay, which they spread over the skull, as guided by the points of known thickness, previously built up in the form of pyramids of plaster of Paris, and accurately measured.

Merkel substituted plastilina for ordinary clay, a procedure which has since become universally adopted. Concerning the method of obtaining the exact thickness at the established points, I have used little strips of ordinarily thick writing paper, about a millimeter wide. The strip is bent near the middle into two portions at right angles to each other, and one of them is cut down to a length that corresponds exactly to the required thickness. The unmeasured portion is then used as a standard or foot, and fastened down to the surface of the bone with a little piece of plastilina, while the other piece projects perpendicularly. By carefully building up on both sides of this with more plastilina, any bending of the measuring strip is prevented. I also find it more advantageous to build up the surface as fast as the measures are located, rather than first to cover the skull with these structures; and thus, during the progress of the work, an entire side or the upper part of the face may be completed while the remainder of the skull is still bare.

After their enclosure in the plastilina the little paper strips are as firm and reliable as the plaster pyramids, and the fine white lines of the square-cut ends are always sufficiently obvious. If covered up during the progress of the work they may be found in a moment by rubbing over the spot, and may with equal readiness be concealed at the final finishing of the surface.

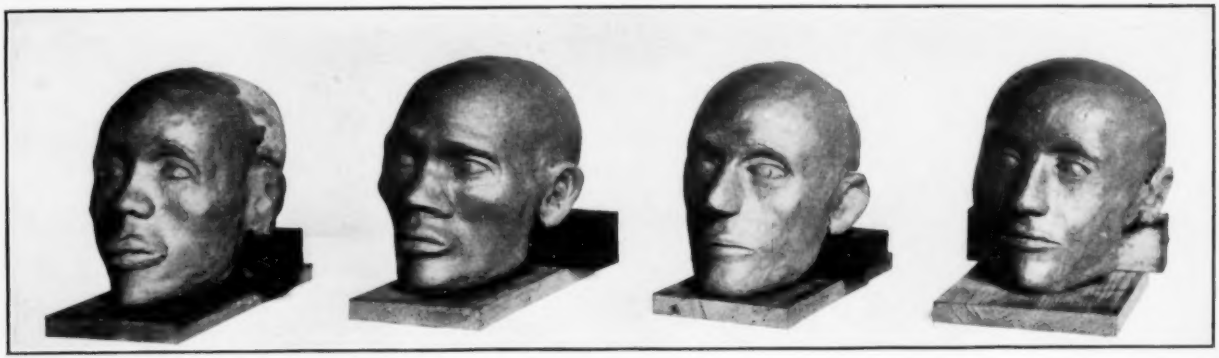
The skulls selected for reconstruction include a man and a woman of the Narragansett tribe in Rhode Island, and two men, presumably Nonotucks, from Hadley, Mass., exhumed about four miles from each other.

The details of the four skulls are as follows:

1. Narragansett (male). Exhumed in Jamestown, R. I. (Canonicut Id.)
2. Narragansett (female). Sub-type: Niantic. Exhumed from "Indian Burying Hill," Charlestown, R. I.
3. Nonotuck (male). Exhumed in Hadley, Mass., at "Indian Hill," near Hockanum, on east bank of Connecticut river.
4. Nonotuck (male). Exhumed in North Hadley, Mass., on east bank of Connecticut river.

The first of these is No. 41763 of the collection of Phillips Academy, Andover, Mass., and was kindly lent to me by the

RECONSTRUCTIONS, IN PLASTILINA, OF FOUR NEW ENGLAND INDIANS



RECONSTRUCTIONS, IN PLASTILINA, OF TWO NEGRO MALES AND TWO WHITE FEMALES

curator, Mr Warren K. Moorehead.[1] The second is a skull of real historical value, being that of a daughter of the Niantic chieftain Ninigret. She died young in 1660, and was buried in a log sarcophagus, surrounded by articles of value, in a parcel of land set apart for the purpose by her father, who followed in this the custom of the English. Her body was exhumed in 1859, apparently out of curiosity, but by good fortune the skull came eventually into the possession of Dr Usher Parsons of Providence, who presented it before the Rhode Island Historical Society, in 1862, and published his paper in the *Historical Magazine*, Feb. 1863, pp. 41–44. Through his son, Dr Charles W. Parsons, the skull came into the possession of Brown University, and was entrusted to me by the present director of the Museum there, Dr Albert D. Mead. To both him and Mr Moorehead I wish to acknowledge my indebtedness.

The other two skulls are local, and belong to the Smith College collection. The last was excavated in October 1904, and an account of it was published in the *American Anthropologist* for April–June 1905, pp. 295–300.

In the first row of pl. XXV are given the photographs of the reconstructions in plastilina, built directly upon the skulls by the use of the measurements given above. In this row the order is a chance one, in which the young Narragansett woman comes first upon the left, followed in order by the North Hadley young man, the Narragansett man, and the man from Hadley (Hockanum).

To test the method as to both racial and individual characters I also built up faces in the same manner, and with the same measurements, upon the skulls of two negro males and two white females, and the results of these are given in the second row of the same plate. The first on the left is that of a negro male of 30 years, from the Medical Department of the University of Missouri. The body was obtained from the Fulton Asylum, and the cause of death was recorded as pulmonary tuberculosis.

The history of the second head, also a negro, is peculiar, as it represents to a certain extent a test of the accuracy of the method.

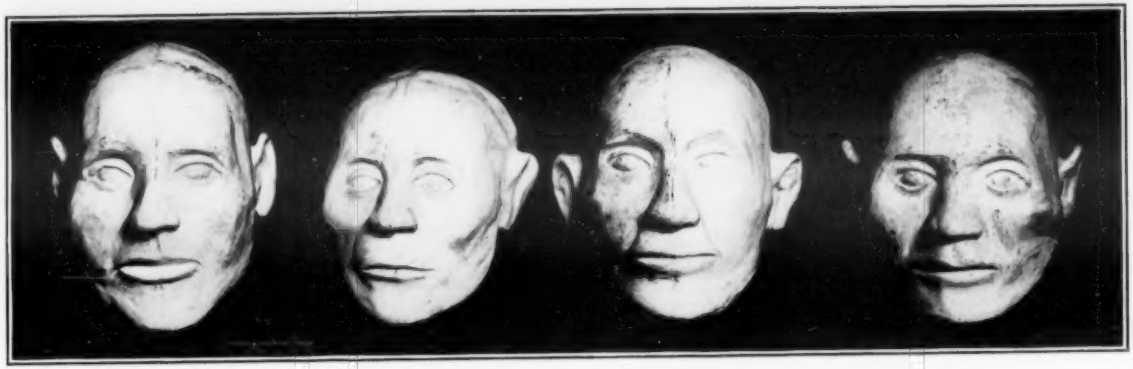
[1] An accompanying label reads: "Skull of New England Indian. Presented by Ferdinand Ambrust, Jamestown, R. I."

This skull was one that I prepared some 25 years ago, and I still remember in a general way the appearance of the face before preparation. I purposely, then, selected it for use in teaching the method to a young man of Northampton, Mr Leigh Hoadley, who sometimes aids me as a volunteer assistant. I taught him the general methods of building up the proper thickness at the various points, and located the points for him; then, without saying anything whatever about the skull, save that I had prepared it, dismissed him to finish the work by himself. Naturally one cannot rely too much upon the memory of such a thing as the face of a dissecting-room subject after so long a time, but when, on the next day, Mr Hoadley brought me his finished result, as given here, it recalled the face of the subject and the circumstances very distinctly and appears to me a good copy of the original.

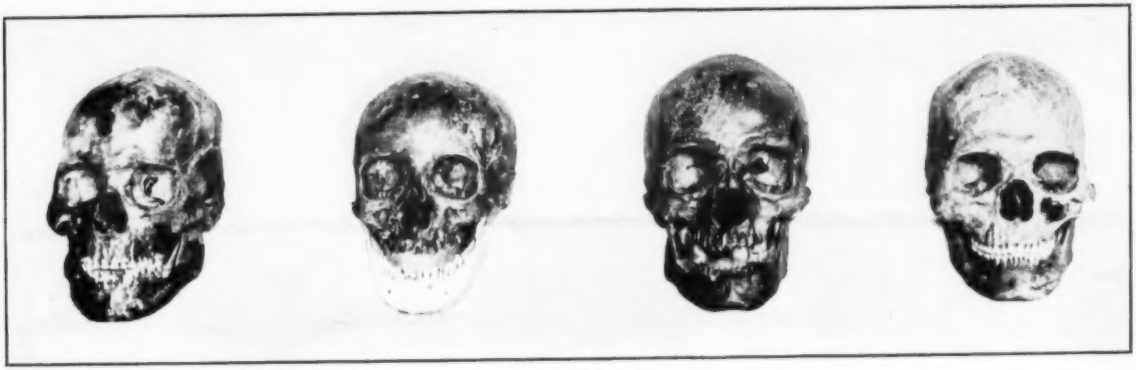
The third and fourth of the series are those of young white women, the third prepared in New York forty years ago, and the fourth a skull purchased from Ward, of Rochester. The reconstructions were very hastily done, merely as tests of race, but seem satisfactorily European.

The first row in pl. XXVI was photographed from the finished casts, which were done in plaster direct from the plastilina, but since the white color offers some advantages to the camera, and especially since the original models received considerably more smoothing and finishing after the photographs of pl. XXV were taken, it has seemed best thus to present them again in their finished form.[1] They are, furthermore, arranged here in the order of the list given above, the two Narragansetts, man and woman, upon the left, the two Nonotucks from Hadley upon the right. The second row shows the skulls of the same, in the same order, taken after the removal of the plastilina subsequent to the casting. In the case of the young Narragansett (Niantic) woman the mandible was wanting, and the substitution was made of a fairly well-fitting piece from a female white skull. In completing the restorations, however,

[1] The work of casting my plastilina originals in plaster was most skilfully carried out by Mr E. A. Thompson, of Amherst, to whom also I am indebted for the final finishing of the surfaces.



PLASTER CASTS OF THE PLASTILINA RECONSTRUCTIONS, ALTHOUGH IN A DIFFERENT ORDER (SEE TEXT)



SKULLS USED IN THE RECONSTRUCTIONS. THE ORDER OF THESE TWO ROWS CORRESPONDS

it was soon found that the usual measures could not be used for the substitute jaw, and the plastilina was put on quite without reference to the contours of the bone, the attempt being made only to present a jaw and chin similar to that of the other Indians, but weaker and more feminine. In doing this the substitute bone was left quite bare in places, while in others it was buried beneath a mass of plastilina which had no anatomical meaning, thus clearly showing the individual, and perhaps also the racial, character of skeletal parts.

Thus, in studying this historically important face, it must be constantly kept in mind that the jaw and chin, from the mouth down, are hypothetical; yet, if one cover this portion with the hand, it will be seen that the part thus supplied is non-essential, and scarcely alters the general expression. Any great departure in facial expression and contour from the present restoration could be occasioned only by the slight chance that the young woman may have had some very individual and peculiar type of jaw, like her associate, the Narragansett man, which is not likely. If these parts were originally of the usual type the young daughter of Sachem Ninigret must have looked very much as here presented.

To emphasize still further the personality of this Narragansett pair they are presented by themselves, on a somewhat larger scale, in plate XXVII. In this they are posed a little, to appear more as people are generally seen, and a bit of cloth is twisted about the head of the young squaw, to obviate the bald appearance of the restoration without hair. As a matter of fact, when exhumed, a large quantity of hair was still present; and even now, upon the more sheltered part of the occipital bone, there is a thin crust of foreign substance, which consists mostly of short pieces of hair, closely felted together, and bleached to a light yellow brown.

Concerning the Nonotuck Indians we have almost no historical account except the mark of a few of them upon local deeds mostly made out to the Pyncheon company at Springfield. They were more or less under the control of the more powerful Pocumtucks to the north of them, who possessed a chief settlement at or near the present Deerfield. Their restoration has thus a special interest, as it

supplies data that were supposedly lost forever. The face of the young man from North Hadley (pl. XXVIII) is an interesting type because of its extreme shortness and broadness. Measured upon the skull, the breadth between zygomatic arches (estimated, because of a deficiency upon the right side) is 137 mm., the same as in the larger skull of the other Nonotuck. This, when compared with a nasion-prosthion line of 63, gives a superior facial index of but 46. This index in the other Nonotuck is 53.3, and in the male and female Narragansetts respectively 52.6 and 56.4. Both from the physiognomy, the cranial capacity of 1275 c.c., and the absence of all associated artifacts in his grave (*American Anthropologist*, 1905, l. c.), it is safe to conclude that in this young man we have simply one of the rank and file, an ordinary person of low rank, and, probably, of limited intelligence. The cranial capacity of the other Nonotuck is 1473, and that of the Narragansett man is 1370. The little Niantic squaw, as would be supposed from the small size of the skull, has a small cranial capacity, only 1245 c.c., but the remarkably good frontal contour, the cerebral portion of which is very high, quite compensates for the lack of size, especially in a presumably small body, and argues a high degree of intelligence. If we compare this frontal contour (as taken with the Lissauer diagraph) with that of her three associates, we find that in her case the contour gives a frontal contour angle of 131°, as compared with the flatter angles of 132.7° for the large Nonotuck, 136.8° for her Narragansett associate, and 140° for the little, unintelligent man from North Hadley.

To these few anthropometric data, which are taken from a more extended work in preparation upon the skulls of New England Indians, there may be added the usual cranial indices, together with the total maximum length and breadth measurements. These, with the latter placed in fractional form, as in obtaining the cranial indices, are as follows:

1. Narragansett (male) $\frac{126.5}{185} = 68.3$.
2. Narragansett (female) $\frac{137}{174} = 78.74$.
3. Nonotuck (male). The larger one $\frac{139}{182} = 76.37$.
4. Nonotuck (male). The smaller one $\frac{134.5}{182.5} = 73.42$.

CASTS OF THE RECONSTRUCTED HEADS OF TWO NARRAGANSETT INDIANS. THE ONE ON THE LEFT IS THE YOUNG DAUGHTER OF SACHEM NINEGRET, THE OTHER A MAN FROM CANONICUT ISLAND

By this the Narragansett male specimen is shown to be extremely dolichocephalic, a striking character of the original skull, while the young squaw has an unusually broad head for a New England Indian. The others are more nearly the usual form, and this, as well as in the other features, appear as good types of their race.

In criticizing the actual value of the method of restoration the weak point is seen at once, namely, the opportunity for imagination on the part of the manipulator in the case of such features as the lips, the soft parts of the nose, and the setting of the eyes. The room for the personal equation is, however, not nearly so great as it would seem, for although not all the possible correlations between these soft features and the underlying and supporting hard parts are as yet known, at the same time the range of possibilities for the working of the imagination is seen to be much restricted when one attempts for himself an actual restoration.

In the nose, for example, the nasal bones often extend a long way down the profile, and give such a definite beginning to the outline that, with the terminal limit distinctly marked by the akanthion, there is practically but one possible way of completing the contour. The lower outline of the piriform fossa locates the point of attachment of the septum and the position of the two nostrils; and by the level of these last two, as well as by the shape of the bony septum, one can learn whether the nose was straight or scoliotic, and, in the latter case, to what degree. The breadth between the wings can be obtained with considerable exactness by obtaining the nasal index in the skull and ascertaining the index of the living face to which this value corresponds. For an exact correspondence we are perhaps not yet ready, but, to start with, the points generally accepted in each case as the boundaries between the classes of nasal indices may be taken as equivalent. Thus, on the skull a nasal index of 47 is the lowest number of the mesorrhine class, while in the case of the living this place is held by a nasal index of 70. Thus the numbers 47 and 70, in the two cases, skull and living, may be considered as about equivalent, and the same may be postulated of the indices 58 and 100 respec-

tively, which mark the entrance into the class of platyrrhine, or chamærrhine, noses. Starting with these as fixed points of comparison, it will be seen that every single point in skull indices corresponds to three on the living, or, beginning with 48 = 70, we have 49 = 73, 50 = 76, and so on. Now, if these figures be taken as approximately correct, one can easily find from the nasal index of the skull that upon the face of the same individual while living, and since the length is the same in both conditions (nasion-akanthion), with the termini precisely indicated, one may thus readily obtain the exact breadth of the fleshy nose between the outer limits of the alæ.

With the mouth the data are at present somewhat less precise, but from a few observations upon the living, the oral slit, when the mouth is in repose, seems to coincide with the line formed by the edges of the upper teeth, and to extend upon each side to about the middle of the second premolar (bicuspid) tooth.[1] These points may be fixed upon the skull, while at work, by inserting pins or small toothpicks and fastening them in the proper position by plastilina. They will thus remain in place, and give the proper location for the external features, during the subsequent progress of the work and at any level to which the plastilina is built. When the mouth is nearly completed they may be withdrawn and the holes obliterated.

The size and fulness of the lips themselves, although not given directly, are strongly indicated by the fixing of the median points above and below them, the center of the hollow of the upper lip, which in the living is directly over the prosthion upon the skull, and the center of the transverse furrow of the chin, which marks the base of the lower lip. These points, with the slope of the alveoli and teeth, together with the exact position of the mouth slit, hedge the problem around with so many conditions that there is slight opportunity for the manipulator to vary his work, or to construct more than one type of mouth upon a given skull. In determining the two median surface points it might be better, in the

[1] Merkel determined a constant direct relation between the extent of development of the jaw muscles and the length of the oral slit.

PLASTILINA RECONSTRUCTION OF A YOUNG NONOTUCK MAN FROM NORTH HADLEY, MASS. EXHUMED BY SMITH COLLEGE IN 1904

CAST TAKEN FROM THE PLASTILINA RECONSTRUCTION SHOWN AT THE LEFT, AFTER FINISHING

case of a negro skull, to use the measurements given for the Hereros, but even with European measures, as were employed in the two negro reconstructions given here, the thickness of the lips seems sufficiently marked, with only the slant of the alveolar surfaces as a basis.

The construction of the eyes became transformed from an unsatisfactory sort of guesswork to a simple and fairly precise piece of work by a method which developed during the course of my study, and the result will appeal to one from the underlying anatomical principles upon which it is based. For each orbit I construct a plastilina eyeball, of the proper size to allow a sufficient space for the eye-muscles, glands, and other surrounding structures, and fix this immovably upon a little bed of cotton, previously packed into the deepest part of the orbit. In the placing of this eyeball there is still some lack of precision in its forward and back location, yet it will be seen from the study of living people that in most cases a wooden ruler or other firm object with a straight edge may be placed vertically over the closed eye and just come into firm contact with the superciliary ridge, the lower lip of the orbit, and the surface of the lid-covered eyeball. As all three points of contact are covered with skin of approximately the same thickness, this means that, on the average, the plastilina eyeball should be set in until the upper and lower lips of the bony orbit and the front surface of the ball are in line.

As a check upon this we have the orbital index (I use the Adachi method), and where this is large, indicating a round orbit and a large, full eye, I allow the ball to project a little, while in the opposite case it may be sunk in, a little back of the usual position. Indians, for example, are generally hypsiconch (megaseme), with large and projecting eyeballs, and in life the form of these latter is often seen through the skin considerably beyond the palpebral opening.

The position of the two canthi is almost precisely determined, the inner by the naso-lacrymal duct, and the outer by a slightly but definitely indicated "malar tubercle," to which attention has recently been called by Whitnall.[1] As in the case of the features

[1] *Journal of Anat. and Physiol.*, 1911.

of the mouth, these points can be kept through all the manipulations by means of pins.

Having determined so much, after the external skin surface has been laid on entirely around the orbit, as far as its margin, the surroundings of the eye may be completed by laying on the lids. These are best made by themselves, of an approximately proper size and thickness, and then fitted to the conditions after being laid on. Here, as elsewhere, the final finishing is done by means of the usual wooden tools which sculptors employ, cut into various shapes, and consists mainly of cutting and smoothing the free edges of the lids, smoothing the eyeball, emphasizing the canthi, and so on. The final result is an eye of some anatomical detail, the essential parts of which are definitely determined from indications furnished by the skull.

For the external ear I have as yet no data other than that of position, as given by the auditory opening. In this it must be observed, as pointed out by Welcker in 1883 (*Schiller's Schädel*, p. 61), that the openings of the external ear and of the skull do not coincide, but that the latter lies upon the average 5.3 mm. farther back, and the same distance higher than the other. Much is to be expected of the careful study of the external ear of different races, as now investigated by Bean, so that in the future it will be possible to add to a reconstruction at least the conventional ears of the race to which the individual belongs. In the case of the young Indian from North Hadley I have purposely set the ears well out, since the face and head seem to suit that form. The case is wholly without other basis, but with regard to both this and the other reconstructions it is to be observed that in a head shorn of hair, as these all are, the external ears appear more prominent than when the hair is present.

Undoubtedly a more detailed study of these special features—nose, mouth, and eyes—in a large number of bodies, and the subsequent study of the macerated skulls of the same individuals, would add greatly to our knowledge of the definite points indicated in the bone, and would render the reconstruction of these features much more exact than at present. There are undoubtedly many

more correlations between the soft features and the underlying hard parts that we have not yet learned to read, since, theoretically, every change in the first, in a region where the two are so intimately associated as in the face, must cause corresponding modifications of the latter. The droop of a lip, or increased weight in an eyelid, presumably brings with it some change in the underlying bone, and these correlations we may sometime learn to read.

It is very probable, too, that we may obtain some help from an allied line of investigation now being extensively followed, namely, the study of the facial muscles in the different human races (Ruge, Popowsky, Forster, Fischer, von Eggeling, Loth, and many others). The facts thus obtained will be of direct service in informing us which lines to emphasize, and which surfaces to strengthen in building up the faces of different racial types, and will probably serve to guide us to many of the correlations we seek by pointing out the places where such are likely to be found.

In two points only, that of the bodily condition of the subject, whether well-nourished or emaciated, and that of the presence and location of wrinkles, two closely associated superficial characters that differ at times in the same individual, can the skull not be expected to furnish much information; and inasmuch as these details, superficial as they are, are generally much relied upon in the sight recognition of individual faces, the method here discussed will always, to the unscientific, have its deficiencies. Even here, however, certain of the deeper folds and wrinkles can be inferred from the general relations and amount of development of the other parts, and assuredly many of the traces of senility are very apparent in the bones. It is thus quite warrantable for us to adopt even the extreme view of Holl, that "der Formenreichthum der skeletirten Gesichtsschädel ist ein so grosser, dass jeder dieser eine bestimmte Physiognomie aufweist; sie sind von einander gerade so verschieden, wie es die Gesichter der Lebenden sind."[1]

This extreme individuality of the bony faces in skulls is not easy to recognize, since not even a professional craniologist experiences the daily and hourly drill in the selection and comparison

[1] M. Holl, Ueber Gesichtsbildung, in *Mitt. anthrop. Ges. in Wien*, 1898, p. 57.

of features which we all of us experience from our infancy in the case of faces, but by spreading over a skull a plastic mass of a definite thickness the surface with which we are all familiar is brought out, and the individuality at once appears.

As a method the results seem, at least, satisfactory, but it needs not only many new observations concerning the correlation of hard and soft parts, but also a large number of tests like that of the negro skull above mentioned, where, by death-masks, photographs, or actual acquaintance, the appearance in the flesh may be put on record, and compared with the completed restoration, made by an operator kept in ignorance of the records.

When perfected, there is practically no end to the application of this reconstruction method. Not only is there an important medico-legal aspect of the case, in the numerous instances in which the identity of a given skull comes in question, but the same question comes up frequently in such cases as those of Bach and Schiller. Of the 278 skulls recently obtained from the wreck of the *Maine* but few could be identified, and these only by swords and other associated objects. Had the skulls been reconstructed by this method, it is probable that with the coöperation of relatives and former friends, but very few would have remained unidentified.

Other important applications are the reconstructing of ancient or prehistoric skulls, like those of the ancient Cretans, Oscans, Etruscans, and so on, or those of the Romans of classic times, notably those from Pompeii. These latter would be of especial interest, since they could be directly compared with the sculptured portraits found in association with them, occasionally, perhaps, portraits of the same individuals or of near relatives. The Roman Church, also, has preserved as relics many an ancient skull, with a more or less authentic record, and in such cases the historical interest might often be considerable.

There is much need of work in this direction, and the writer of this paper would welcome any coöperation. The method itself is so simple that it can be readily performed by any one who follows the directions here given, and the very first attempt cannot help being at least moderately successful. The subject is already receiving

considerable attention in Europe, as may be seen by the work of the last session of the Anatomische Gesellschaft at Munich (April 1912), the program of which included the presentation of the genuine skull of Schiller by Froriep, as already referred to, and the demonstration of several new plastic reconstructions by von Eggeling. In the skulls of our aborigines we in America have some interesting and important material, the study of which may thus be furthered.

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THE ABORIGINAL USE OF TURQUOIS IN NORTH AMERICA[1]

By JOSEPH E. POGUE

Introductory

THE use of turquois in North America, apart from its modern application in jewelry, has been confined to Central America, Mexico, and the southwestern portion of the United States, and within this territory it has been known and prized for centuries. At the time of the Spanish conquest there were, broadly speaking, three somewhat distinct groups of aborigines within this region: the Zuñi, Hopi, and allied tribes dwelling in pueblos in the elevated plateau of New Mexico, Arizona, and northern Mexico; the Nahuan tribes, commonly designated as Aztecs, with a higher degree of culture than the Indians to the north, occupying the mountainous region of Mexico; and the Maya, Quiché, and kindred peoples of Central America. In all three provinces the turquois found both a religious and an ornamental use, and there are striking analogies between its application among widely separated tribes. With the passing of the ancient Nahuan and Mayan cultures, however, the use of the turquois dwindled to unimportance south of the northernmost provinces of Mexico; but not so in the Pueblo region, where the mineral holds the same high place today that it did centuries ago.

The information concerning the use of turquois by modern Indians is drawn from writings of ethnologists and other observers, and study of the objects themselves, a number of which are in the

[1] Published by permission of the Smithsonian Institution.

This paper is extracted from the manuscript of a forthcoming work in which the writer attempts to present the available information bearing on the history, ethnology, mythology, and folklore, as well as the mineralogy, geology, and technology of turquois. He realizes that many facts of interest have escaped him, and will be grateful for suggestions and data, not only relative to the subject of this paper, but to turquois in general.

ethnologic collections of the United States National Museum.[1] The evidence for deducing the application of turquois among the ancient tribes is derived from two different and wholly independent sources: firstly, the objects now existing in various collections and available through accurate descriptions; secondly, the writings of the old Spanish chroniclers, who were first-hand observers of the actual conditions. A few words concerning the relative weight of the two classes of evidence: The first, in most instances, can hardly be questioned; the turquois in the objects described has in many instances been identified as such by competent mineralogists. The historical evidence is more open to doubt: we cannot always be sure that the precious stone described as turquois is really such. The descriptions of it are sometimes confusing and conflicting, and were the historical accounts the only basis the entire ancient use of turquois might be open to reasonable doubt. So many turquois objects are known, however, and some of these so closely fit the descriptions of the old writers, that the historical evidence, by corroboration, assumes a weight it would not have alone and in the main can safely be accepted.

In the old Spanish writings there is frequent mention of a green precious stone prized by the Aztecs and called by them *chalchihuitl* (pronounced chal-che-we′-tl). This has been the subject of much discussion, some maintaining that it represents jade, others that it was turquois, others that it was in part jade and in part turquois, still others that the term included many varieties of green gems, and so on. This subject will receive special treatment elsewhere: it is possible here only to state the conclusions reached by the writer, namely, that the early writers confused several green stones under this term; the natives, however, used it more strictly to designate one of their most valued precious stones, in the Southwest this being turquois, in Mexico and Central America probably jade. The uses of chalchihuitl and turquois were very similar, and in discussing the latter an occasional allusion to the former cannot be avoided.

[1] The writer had occasion to spend three months among the Navaho and Hopi of northern Arizona in 1910 and was afforded good opportunity to observe the use of turquois among these tribes. He has also inspected with profit the ethnologic collections in the British Museum and the Berlin Museum of Ethnology.

It may be useful to bear in mind the relative, rather than the absolute, antiquity of the races which have used turquois.[1] For example, the culture of Mexico at the time of the conquest was more archaic than that of Egypt under the Pharaohs, and certain of the tribes of our Southwest, the Hopi, for example, are almost as primitive today as the dwellers in the lake-villages of Switzerland during Neolithic times.

The Use of Turquois in Mexico and Central America

Use as Attested by Historical Evidence

The first European to come in contact with turquois in the New World was probably Juan de Grijalva, the discoverer of Yucatan. According to Gomara,[2] he secured by barter from the natives of this country in 1518 three gilded masks of wood, covered with mosaics of turquois. It is not unlikely that one, if not all, of these is in existence today.[3] Proceeding on the same expedition to San Juan de Ulloa, Grijalva obtained further ornaments from the natives, including four turquois-incrusted ear pendants and five gilded mosaic masks (nature of mosaics not described).

It was in the following year that Fernando Cortés made the first of a series of daring moves that so quickly resulted in the overthrow of the "Aztec Empire". It is related that upon landing at San Juan de Ulloa he was met by numbers of natives, of whom it was observed[4] that "Among the rest or rather aloofe off from the rest were certaine Indians of differing habit, higher than the other and had the gristles of their noses slit, hanging over their mouthes, and rings of jet and amber hanging thereat: their nether lips also bored and in the holes rings of gold and Turkesse-stones[5] which weighed so much that their lips hung over their chinnes leaving their teeth bare.

[1] For a good discussion of the degrees of culture embraced by the terms savagery, barbarism, and civilization, consult Fiske, *The Discovery of America*, Boston, 1892, vol. I, pp. 24–38.

[2] *Histoire générallе des Indes Occidentales, et Terres Neuues*, French trans. by M. Fumée, Paris, 1606, pp. 64, 65.

[3] See pages 450, 451.

[4] Purchas, *Pilgrimes*, London, 1626, vol. v, book 8, chap. 9, p. 859, quoted by Dall, *3d Ann. Rep. Bur. Ethnol.*, 1881–82, p. 85.

[5] The custom of wearing labrets of turquois was also practised in South America.

These Indians of this New Cut Cortez caused to come to him and learned that they were of Zempoallan a citie distant thence a dayes journey whom their Lord had sent; . . . being not subject to Montezuma but onely as they were holden in by force."

Cortés immediately dispatched envoys to enter into negotiations with Montezuma, ruler of the Aztecs, who returned ambassadors to the Spanish camp, bearing princely gifts. Sahagun[1] enumerates in detail these presents, and his inventory includes: (1) A mask, incrusted with a mosaic of turquois, carrying upon it a snake, coiled and twisted, worked of the same stone; (2) A bishop's crozier[2] all made of turquois in mosaic work, and terminating in a coiled snake's head; (3) Large earrings of chalchihuitl, in serpent design; (4) A mitre[2] of ocelot's skin, surmounted by a large chalchihuitl, and decorated with turquois mosaic, and (5) A staff[2] adorned with mosaic of turquois.

According to other accounts,[3] Montezuma later sent further gifts, intended for the Spanish King, including four chalchihuitls, each, according to the estimates placed upon them by the Mexicans, "worth a load of gold." The identity of the four stones cannot be definitely settled. Kunz,[4] however, remarks that "it is a well authenticated fact that the gems referred to were turquoises, and it is believed that they are among the crown jewels of Spain."

The Spaniards soon penetrated to the high plateau of Mexico and seized the personage of Montezuma. They found the turquois esteemed throughout the country, and the many uses to which it was put are recorded in the writings of their chroniclers.

The turquois was employed not only as an ornament, but found an important religious and ceremonial application as well. A

[1] *Histoire générale des choses de la Nouvelle-Espagne*, French trans. by Jourdanet and Siméon, Paris, 1880, pp. 799–800.

[2] These were among the insignia of Quetzalcoatl and their presentation to Cortés suggests that the latter was thought to be this fair-skinned god, returning from the east as had been prophesied. Mrs Nuttall (The Atlatl or Spear-thrower, *Peabody Museum Papers*, Cambridge, 1891, vol. 1, no. 3, pp. 21–23) deems these examples to be a form of atlatl, or spear-thrower, and states, "It appears that all three were sent to Europe."

[3] Clavigero, *History of Mexico*, Cullen's trans., Phila., 1817, p. 282. *The Memoirs of Bernal Diaz*, Lockhart's trans., London, 1844, vol. 1, p. 93.

[4] *Gems and Precious Stones*, New York, 1890, p. 63.

Nahuan king was interred with great pomp, a mask either painted or of gold, or of turquois mosaic, being placed over his face.[1] A pendant of turquois hung from the underlip of Topiltzin, the chief of six priests customarily engaged in human sacrifice;[2] "under the lip upon the midst of the beard hee had a peece like unto a small canon of Azured stone."[3] In the month of Izcalli a feast was celebrated in honor of Xiuhtecutli,[4] the God of Fire, and an image of this Aztec Vulcan was adorned in fine raiment; from its ears hung pendants wrought in mosaics of turquoises,[5] and its left hand grasped a shield surmounted by five green chalchihuitl stones placed in the form of a cross upon a gold plate.[6]

Quetzalcoatl, Lord of the Winds, and the mysterious hero-god of the Mexicans, is supposed to have introduced the art of working precious stones.[7] In the sacrifices and fetes held in his honor he is represented as wearing blue turquois earrings in mosaic.[8] He was worshipped as the god of commerce by merchants who bought, sold, and worked in precious stones.[9] According to tradition the palace of this personage was composed of four apartments, lavishly decorated; the easternmost one "called the hall of emeralds and turquoises, because its walls were embellished with stones of all kinds arranged in mosaics of wonderful perfection."[10] Catmaxtli, the father of Quetzalcoatl, was adorned with a mask of turquois mosaic during the feast of Catmaxtli.[11]

[1] Bancroft, *Native Races of the Pacific States of North America*, New York, 1874, vol. II, p. 606. "Speaking of the obsequies of Tezozomac of Azcapuzalco, Ixtlilxochitl says that a turquois mask was put over his face . . ." *Relaciones*, in Kingsborough, *Mex. Antiq.*, vol. 9, p. 370. Veytia states that it was a gold mask "garnecida de turquezas."—*Hist. Ant. Méj.*, tom. IV, p. 5.

[2] Clavigero, loc. cit., 1817, vol. II, p. 52.

[3] Purchas, *Pilgrimes*, London, 1626, vol. V, book 8, chap. 9, p. 871, quoted by Dall, *3d Ann. Rep. Bur. Ethnol.*, 1881–82, p. 85.

[4] *xiuitl* = turquois, herb, year, or comet, and *tecutli* = lord.

[5] Sahagun, loc. cit., p. 27.

[6] Ibid., p. 50.

[7] Torquemada, *Monarchia Indiana*, Madrid, 1723, vol. II, p. 48.

[8] Sahagun, loc. cit., p. 16.

[9] Peñafiel, *Monuments of Ancient Mexican Art*, Berlin, 1890, p. 12.

[10] Sahagun, loc. cit., vol 2, p. 656. See also Bancroft, loc. cit., vol. 2, p. 173. Emerson, *Indian Myths or Legends*, Boston, 1884, p. 9. Nuttall in *Peabody Mus. Papers*, Cambridge, 1901, vol. II, p. 294.

[11] Bancroft, loc. cit., vol. 2, p. 314.

Each Aztec god was represented as carrying some form of atlatl, as a symbol,[1] and these objects, fashioned in snake design and inlaid with turquoises, were in ceremonial use at the time of the conquest. In the great festival in honor of Quetzalcoatl, his high priest was preceded by a "mace-bearer with a sceptre shaped like a monstrous serpent, all covered with mosaic composed of turquoises."[2] Similar insignia were presented to Cortés by Montezuma, as has been noted. The serpent-shaped atlatl of the hero-god Huitzilopochtli was called *Xiuatlatl*, meaning blue or turquois atlatl.[3]

The ornamental use of turquois was no less interesting. Montezuma, as high-priest and representative of a god, wore necklaces of precious stones, fine and large, consisting of chalchihuitls and turquoises of finest quality.[4] The latter, indeed, were of such value that they could be worn only by the first of the land. The dress of the nobles is thus described by Sahagun:[5]

"The Mexican lords wear wrist bands of black leather made pliable with balsam, and decorated with strings of chalchihuitl or other precious stones. They used to wear chin ornaments of chalchihuitl set in gold and implanted in the flesh. Some of the ornaments are large crystals with blue feathers in them, which gives to them the aspect of sapphires. They wear many other precious stones protruding through openings made in the lower lip. The noses of the great lords are also pierced and they wear in the openings fine turquoises and other precious stones, one on each side."

Annually the tribes under the dominion of Montezuma were required to pay tribute, including jewelry and ornaments of great value. As recorded in the "Book of Tribute" and translated by Peñafiel,[6] these consisted of a "gold circle, gold diadem, gold necklace, pearls of chalchihuitl, masks of turquois stone, turquois stone not cut, stones of rock crystal with shades of blue and with gold mounting, pendants of beryl enamelled in blue, and with gold

[1] Nuttall in *Peabody Mus. Papers*, Cambridge, 1891, vol. 1, no. 3, p. 29.

[2] Sahagun, loc. cit., p. 169. See also Nuttall, 1891, loc. cit., p. 23.

[3] Nuttall, 1891, loc. cit., p. 188.

[4] Sahagun, loc. cit., p. 514. Nuttall in *Peabody Mus. Papers*, Cambridge, 1888, vol. 1, no. 1, pp. 1–52.

[5] Loc. cit., p. 511.

[6] *Monuments of Ancient Mexican Art*, Berlin, 1890, p. 79.

mounting, and plates mounted with turquois stones." Included also therein, according to Clavigero,[1] were "ten small measures of fine turquoises and one cargo of ordinary turquoises." It is known from the Chronicle of Tezozomoc[2] that in the 15th century the Mexicans imported shields and ear-plugs bedecked with turquois mosaics from the people of the Zapotecan tribes and accepted them as tribute.

Very little historical information is available regarding the nature and occurrence of the turquois employed by the old Mexicans. Sahagun[3] writes:

"The turquois occurs in mines. There are some mines whence more or less fine ones are obtained. Some are bright, clear, fine and transparent; while others are not."

Again:

"Teoxiuitl is called turquois of the gods. No one has a right to possess or use it; but it must always be offered or devoted to a divinity. It is a fine stone without any blemish and quite brilliant. It is rare and comes from a distance. There are some which are round and resemble a hazel-nut cut in two. These are called xihutomolli."[4]

In another place[5] he says:

"There is another medicinal stone called xihutomoltetl (from *xiuhtomolli*, turquois, and *tetl*, stone), which is green and white at the same time like chalchihuitl. It is very beautiful. Its moistened scrapings are good for feebleness and nausea. It is brought from Guatemala and Xochonuchco. They make it into strings for hanging around the neck."[6]

Finally, in relating the traditions of the first settlement of Mexico by the natives, Sahagun[7] states:

[1] *Storia antica del Messico*, Cesena, 1780.

[2] See Lehmann in *Globus*, vol. 90, 1906, p. 322.

[3] Loc. cit., p. 771. From this description one would suppose that Sahagun's "turquois" included more than one mineral, for turquoises are not transparent.

[4] Sahagun, loc. cit., p. 772.

[5] Loc. cit., p. 763.

[6] In a manuscript copy of Sahagun in Madrid (quoted by Seler, *Gesammelte Abhandlungen zur amerikanischen Sprache- und Alterthumskunde*, Berlin, 1904, vol. 2, p. 637) it is stated that the turquois was not very hard and that it was first polished with fine sand and then with another polisher. Emery was not utilized as with many other precious stones.

[7] Quoted by Peñafiel, *Monuments of Ancient Mexican Art*, Berlin, 1890, pp. 26–28.

"The Toltecs also discovered the mine of precious stones, called in Mexico Xivitl (Xihuitl), which means turquois. This mine, according to the ancients, was in a large hill situated near the village of Tepotzatlan. . . . At present the same name is borne by an inhabited village near Tulla."[1]

Use as Attested by Objects

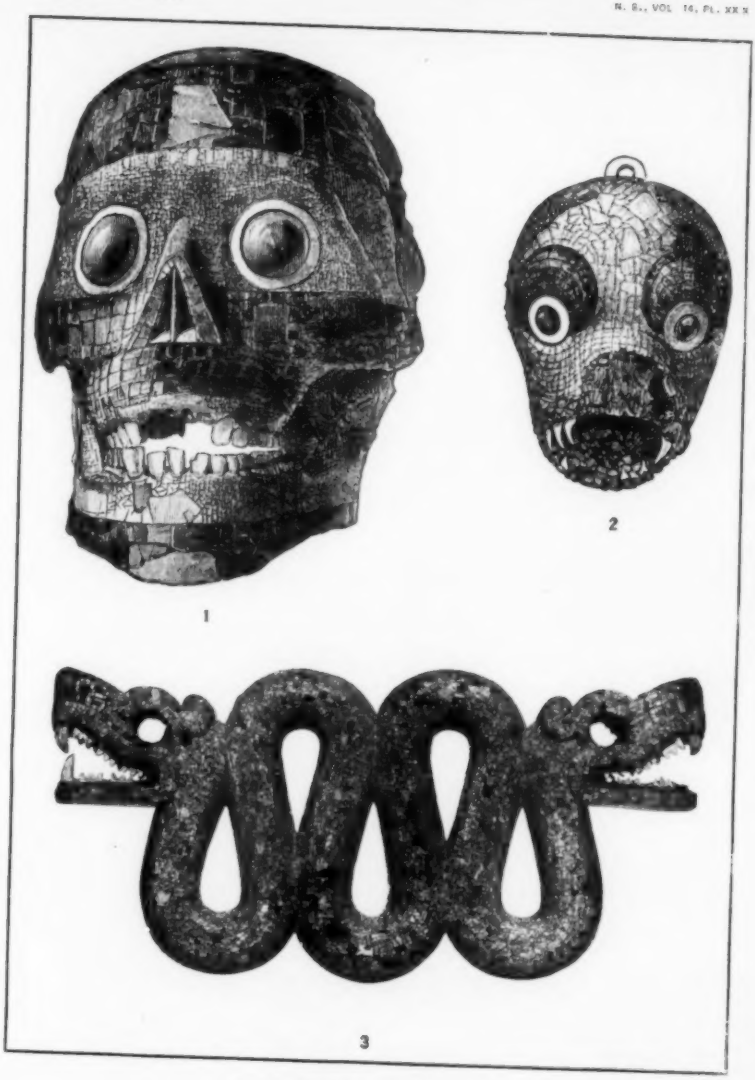
Turquois has been identified in a number of objects originating within the region of ancient Aztec dominion and coming from farther south in Central America. Its presence substantiates, to an important extent, the historical descriptions of its use as developed in the preceding section, and attests the position it held at the time of the Spanish conquest.

Mosaics.—One of the most interesting and highly developed arts in prehistoric America was that of incrusting objects for ceremonial and ornamental purposes with precious and semi-precious stones.[2] Ancient mosaics, showing skill in workmanship and taste in design, are to be seen in many of the leading museums. This form of art reached its highest development in ancient Mexico (including Central America), although excellent examples are known from ruins in the southwestern portion of the United States, and objects from Peru inlaid with turquois[3] indicate a similar, though less perfected, application in South America. The materials usually employed were turquois, jadeite, malachite, quartz, beryl, garnet, obsidian, pyrite, gold, and vari-colored shell, cemented to a base of wood, bone, or stone by means of a tenacious vegetal pitch of local origin. Only twenty-four examples from Mexico and Central America are now known. As a result of a peculiar coincidence of circumstances, twenty-three of these are to be found in European museums, most of this number having reached the continent during Spanish occupancy of the region in question. The best preserved of these objects are very beautiful and are among the highest types of art attained in aboriginal America.

[1] Not far from Mexico City.

[2] Gomara (*Histoire généralle des Indes Occidentales, et Terres Neuues*, trans. into French by Fumée, Paris, 1606, p. 46) refers to the Aztec custom of inlaying figures and masks of wood with various colored stones.

[3] Joyce in *American Anthropologist*, vol. 10, 1908, pp. 16–23. Joyce, *South American Archæology*, London, 1912, p. 206.



ANCIENT MEXICAN INLAID OBJECTS

1. Mask. Human skull inlaid with turquois and obsidian. British Museum. (After Read.)
2. Pendant. Ape-like head of wood inlaid with mosaic of turquois and other stones. British Museum. (After Read.)
3. Breast ornament of wood covered with turquois mosaic. British Museum. (Photo supplied by T. A. Joyce.)

The mosaics are distributed as follows: Nine[1] in the Christy Collection of the British Museum in London; five[2] in the Prehistoric and Ethnographical Museum in Rome; three[3] in the Royal Museum for Ethnology in Berlin; three[4] in the Imperial Museum in Vienna; two[5] in the Ethnographical Museum in Copenhagen; one[6] in the Ducal Museum in Gotha; and one[7] in the United States National Museum at Washington. These will be described briefly in the order given, followed by a discussion of their origin and significance.

Of the nine specimens in the British Museum, the most interesting and best known is the mask shown in pl. XXIX, 1. It consists of a human skull, the front of which is covered with a mosaic of five transverse bands alternately of turquois[8] and highly polished obsidian. The rear portion has been cut away to admit of its being hung, by the leather thongs which still remain, over the face of an idol, as was the custom in Mexico to mask the gods on state

[1] Tylor, *Anahuac: or Mexico and the Mexicans, Ancient and Modern*, London, 1861, app. 5, pp. 337–339. Bourbourg, *Recherches sur les ruines de Palenqué et sur les origines de la civilisation du Mêxique*, Paris, 1866. Franks, *Guide to the Christy Collection, British Museum*, 1868. Stevens, *Flint Chips*, London, 1870, pp. 324–328. Brocklehurst, *Mexico Today*, London, 1883, p. 194. Read in *Archæologia*, Soc. Antiquaries, London, vol. 54, 1895, pt. 2, pp. 383–398. Oppel in *Globus*, vol. 70, 1896, pp. 4–13. Lehmann in *Globus*, vol. 90, 1906, pp. 318–322.

[2] Pigorini, *Gli antichi oggetti messicani incrostati di mosaico*, Reale Accad. dei Lincei, Rome, 1885. Andree, *Ethnographische Parallelen und Vergleiche*, Leipzig, 1889, pp. 127–130. Read, loc. cit. Oppel, loc. cit. Peñafiel, *Indumentaria Antigua; Vestidos Guerreros y Civiles de los Mexicanos*, Mexico, 1903, pp. 101–103. Bushnell in *American Anthropologist*, vol. 8, 1906, pp. 243–255. Lehmann, loc. cit.

[3] Bastian in *Verh. Berliner Gesellsch. Anthrop.*, 1885, p. 201. Uhle in *Congrès intern. Américanistes*, 7me sess., 1888, Berlin, 1890, p. 738. Uhle in *Veröff. Kgl. Museum für Völkerkunde*, Berlin, 1889, pp. 2, 20. Andree, loc. cit. Peñafiel, 1903, loc. cit. Lehmann, 1906, loc. cit. Lehmann in *Congrès intern. Américanistes*, 15th sess., Quebec, 1906, vol. 2, 1907, pp. 339–349.

[4] Steinhaur, *Handkatalog für die Besuchenden*, Copenhagen, 1880, p. 19; 1886, p. 22. Heger in *Annalen des k. k. Naturhistor. Hofmuseum*, Wien, vol. 7, 1892, pp. 379–400. Lehmann, 1906, loc. cit.

[5] Duc in *Archives de la commission scientifique du Mêxique*, Paris, 1867, vol. 3, pt. 1, pp. 157–158. Anon., *Congrès International d'anthropologie prêhistorique*, C.-R. 4me. sess., Copenhagen, 1869, p. 462. Stevens, loc. cit. Andree, loc. cit. Lehmann, 1906, loc. cit.

[6] Andree, loc. cit. Ibid., *Internat. Arch. für Ethnogr.*, vol. 1, 1888, pp. 214–215. Ibid., *Congrès intern. Américanistes*, 7th sess., 1888, Berlin, 1890, pp. 146–149.

[7] Blackiston in *American Anthropologist*, vol. 12, 1910, pp. 536–541.

[8] Read, loc. cit.

occasions.[1] The eyes are disks of shiny pyrite surrounded by circles of white shell; and the nasal cavity has been slightly enlarged, with the insertion of pink shell.[2] This interesting object was acquired from the Hertz Collection, having previously been obtained about the year 1845 at a sale of a collection in Bruges, suggesting that it was brought from Mexico soon after 1521 and before the expulsion of the Spaniards from Flanders during the revolt of the Low Countries in 1579.[3] No. 2 (pl. XXX, 1)[4] is a mask of cedar wood, formed of two rattlesnake carvings entwined to represent a human face. The front is covered with a mosaic of turquois, of bright blue and dull green color, so distributed as to give to the two snakes a different shade. The specimen is 6.9 inches high and was purchased in Paris in 1870 from the Demidoff Collection. No. 3 (pl. XXX, 2)[5] is a mask of cedar cut to fit the face; its surface is covered with a beautiful mosaic of accurately fitted, polished slabs of turquois, mostly of a brilliant blue. The face is studded with numerous knobs of polished turquois, and the eyes are mother-of-pearl.[6] The specimen, which is in an excellent state of preservation, came from a collection in Florence or Venice. No. 4[7] is a sacrificial knife with blade of yellowish, opalescent chalcedony. The handle is of light-colored wood carved in the form of a crouching human figure, wearing an eagle mask, its face appearing through the widely opened mouth of the bird. The figure is incrusted with a mosaic of turquois, blended with malachite and white and red shell; much of the mosaic has now disappeared from its setting. This piece was previously in the Hertz Collection, having been acquired in Florence or Venice. No. 5[8] is a headpiece, or helmet, cut from a single block of wood with the interior hollowed and painted green. It is carved in ornamental shape, pointed at the

[1] Tylor, loc. cit.

[2] The mask is figured in colors in the publications by Bourbourg and Brocklehurst, previously cited.

[3] Tylor, loc. cit.

[4] Read, loc. cit.

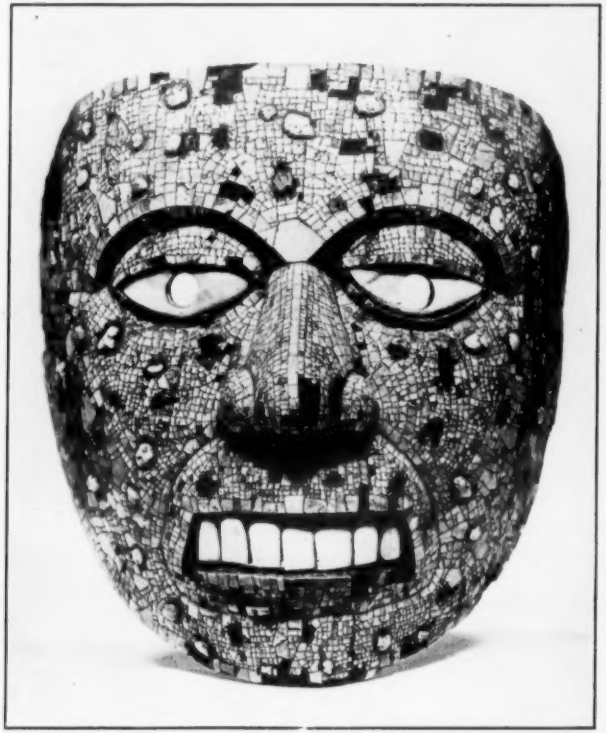
[5] Ibid. Tylor, loc. cit.

[6] Figured in colors in Bourbourg.

[7] Tylor, loc. cit. Read, loc. cit.

[8] Read, loc. cit.

1



2

ANCIENT MEXICAN MASKS OF WOOD COVERED WITH MOSAIC OF TURQUOIS. BRITISH MUSEUM. (PHOTOGRAPHS SUPPLIED BY T. A. JOYCE)

back and front, probably to represent the upper mandible of an eagle, and was covered with a mosaic of turquois, malachite, pearl shell, and pink shell. Much of the mosaic is gone, but sufficient remains to show an involved design, including two conventional rattlesnakes. Its history may be traced back to 1854, when it was purchased in Paris. No. 6[1] consists of a circular disk or shield of cedar, about 12 inches in diameter, with a mosaic of turquois and shell in elaborate design, including the snake, human figure, and geometric patterns. This example was purchased in 1866 from a dealer, who stated that it came from Turin. It resembles in design the famous "Reloj de Montezuma" or calendar-stone in Mexico City. No 7[2] is a pendant of white wood, 4 inches high, carved to represent an ape-like head, with open mouth, as shown in pl. XXIX, 2. The front is covered with a mosaic of turquois, malachite, and other stones. The turquois is mostly of a pale green color, but two patches above the sides of the mouth are a bright blue. This specimen was obtained in 1866 from a dealer who had secured it in northern Italy. No. 8[3] is a breast-ornament of light-colored wood, fashioned in the form of a two-headed snake with body disposed in meander loops (see pl. XXIX, 3). It is 17.5 inches in length, and is covered on the front with a mosaic of fairly uniform turquois slabs, with a line of larger pieces following the middle of the body. It was obtained from an old collection in Rome. No 9,[4] the final example, consists of the figure of a feline animal, with open mouth and protruding tongue, crouching upon its haunches. It is 6.8 inches in height, and was carved from a block of brown wood; its surface shows the remains of a mosaic of turquois, malachite, pink shell, and pyrite. Its history is not known.

The five incrusted objects in Rome have been described and illustrated in colors by Pigorini,[5] and a photographic reproduction of them is shown in pl. XXXI of this paper. They include two

[1] Read, loc. cit.

[2] Read, loc. cit.

[3] Read, loc. cit.

[4] Read, loc. cit.

[5] Loc. cit.

masks, two knife-handles, and a musical instrument or rattle. Mask No. 1 (pl. XXXI, 3) is made of wood, the back hollowed out to fit a human face, and the outside incrusted with a partly preserved mosaic consisting of malachite, turquois, red, white, and blackish shell, and pearl shell, besides a little garnet and several squares of pyrite. The eye cavities and half-open mouth are colored red, and out of the latter issue two white tusks and a tongue, which projects to the chin, where it joins an appendage below, resembling the head of an animal. The piece was acquired in 1878 from the University of Bologna; during the 17th century it was in the collection of Aldrovandus.[1] Mask No. 2 (fig. 4) is somewhat similar to that just described, although its back is not hollowed out. It was obtained in Florence in 1880, and its history can be traced by inventories back to the middle of the 16th century, the first mention of it being in the *Inventario della Guardarobo Medicea* (1553–1559). The two knife-handles (figs. 1 and 2) are in the form of crouching figures, the one human, and the other with a human body and an animal's head with widely open mouth. Both are entirely covered with mosaic of turquois and other minerals, and are somewhat similar to the knife-handle in the Christy Collection in the British Museum. These two pieces are figured in an old catalogue of 1677.[2] The musical instrument or rattle (fig. 5) is made of a human femur, with the ball covered with mosaic, a few pieces of which still remain. Its history is not known.

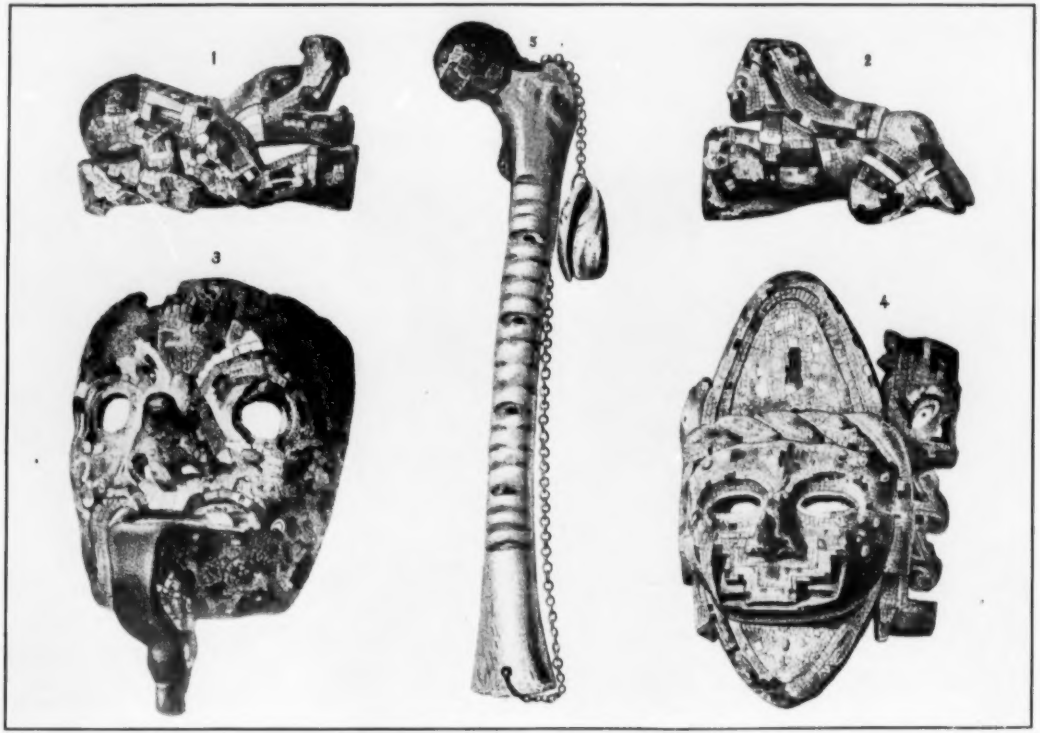
The three ancient mosaics deposited in Berlin include a skull mask and two animal figures. The most interesting of these is the first,[3] which is fashioned from a human skull inlaid over the surface with small slabs of sky-blue to pale turquois. This specimen was previously in the Ducal Museum of Braunschweig. The second piece[4] is a two-headed jaguar, 12.5 inches long, carved

[1] Aldrovandus, *Musæum Metallicum*, Bologna, 1647, p. 550.

[2] Legati, *Museo Cospiano*, Bologna, 1677, p. 477. Licetus (*Pyronarcha sive de fulminum natura deque febrium origine libri duo*, Padua, 1634, pp. 123–126) figures and describes two knife-handles similar to those in Rome and the one in London. Lehmann (1906, loc. cit.) thinks that these two represent the ones described by Aldrovandus (1647, loc. cit.) and are now apparently lost.

[3] Bastian, loc. cit.

[4] Lehmann, 1907, loc. cit.



ANCIENT MEXICAN OBJECTS ADORNED WITH MOSAICS OF TURQUOIS AND OTHER STONES. PREHISTORIC AND ETHNOGRAPHICAL MUSEUM IN ROME. (AFTER PIGORINI)

from a piece of wood and covered with plates of turquois and malachite, with some obsidian, shell, and mother-of-pearl. The eyes are malachite. It came to the museum through the estate of Alexander von Humboldt, who must have secured it during his journey in Mexico, though he left no note concerning its acquisition. The third example is a jaguar head of wood, inlaid with shell, turquois, and malachite. This specimen was formerly in the Ducal Museum of Braunschweig.

There are three turquois incrusted objects in Vienna. No. 1[1] is a circular, slightly convex, wooden shield, about 16.5 inches in diameter. Except for a narrow border it was formerly covered with an elaborate design in turquois mosaic, which has almost entirely fallen away, leaving impressions in the gum indicating its original extent. The object probably formed the center of a shield, somewhat similar to those presented to Cortés by Montezuma. No. 2 represents the head of an animal, carved of light-colored wood and covered with an inlay of pieces of shell, jadeite, turquois, and glass or obsidian. This is of somewhat different make from the other mosaics, and is executed in a much bolder and rougher style. The earliest mention of these two objects was in an inventory for the year 1596. In 1891 they were encountered by Mrs Zelia Nuttall in the Ambras Collection, and were subsequently transferred to the Imperial Hofmuseum in Vienna. No. 3[2] is a Xolotl figure. Its history is not known.

The two specimens in Copenhagen are masks of wood, ornamented with mosaics of turquois, mother-of-pearl, and small shells.[3]

The single specimen in Gotha is a well-made mask in the shape of a bird's head.[4] It is decorated with an inlay consisting of malachite, turquois, mother-of-pearl, red coral, and white shell, but most of the mosaic has fallen out. This object was obtained from a Jesuit collection in Rome about 1800.

The final example forms part of the Blackiston Collection in the United States National Museum, and has an added interest in being

[1] Heger, loc. cit. The turquois was identified as such by F. Berwerth.

[2] Lehmann, loc. cit.

[3] *Congrès International 1869*, loc. cit. Steinhaur, loc. cit.

[4] Andree, loc. cit.

the only specimen of ancient Mexican or Central American mosaic art now known on this continent. The object[1] is a life-sized mask which was formerly covered by a mosaic of turquois[2] and other stones set in a thick layer of gum or pitch. Three greatly elongated projections serve for the nose and two lips. There are two circular openings for the eyes, and smaller ones on the side to carry thongs which bound it to the head. In the forehead is an oval hollow which possibly formed a setting for a large ornamental stone, since fallen out. Along the sides of the face are impressions in the gum of regularly shaped stones, larger than those of the rest of the mosaic. The remainder of the mask was covered by thin, polished slabs of turquois, a number of which are still in place. The turquois is fine blue and green to dirty grayish or yellowish. The mask was recently collected by A. H. Blackiston from a cave in Honduras, near the ruins of the ancient city of Naco.

The twenty-four known mosaics, by way of summary, are as follows:

10 masks { Human skulls, 2 (London, Berlin).
Wood, 7 (2 London, 2 Rome, 2 Copenhagen, 1 Washington).
Bird mask, 1 (Gotha).

5 beasts { Beast heads, 3 (London, Berlin, Vienna).
Beast figures, 2 (London, Berlin).

3 knife handles (1 London, 2 Rome).
2 shields (London, Vienna).
1 helmet (London).
1 double snake (London).
1 bone musical instrument (Rome).
1 Xolotl figure (Vienna).

Except one mask (Washington) recently collected in Honduras, the other mosaics have been in Europe for a long period. Nearly all of them were acquired by European museums from old continental collections. More than half were at one period in Italy[3] (distributed in Florence, Venice, Turin, Bologna, and Rome), the principal owners being the Medici in Florence, Ferdinando Cospi,

[1] Blackiston, loc. cit. The specimen is no. 258271.

[2] Identification verified by the present writer.

[3] Lehmann, 1906, loc. cit.

a relative of the Medici, and Ulysses Aldrovandus in Bologna. As has been noted, some of these (or analogous examples, now lost) were mentioned in old catalogues of the years 1553, 1596, 1643, 1647, and 1677. It is probable that the majority reached Europe during and immediately after the Spanish conquest of Mexico. Most of these are of Aztec origin, though some were probably fashioned by tribes living farther to the south.

According to Lehmann[1] the mosaic art seems to have centered within the country east of the Mexican highland where, he believes, it existed in a specially flourishing condition. The turquois utilized was possibly derived from near-by deposits now unknown. There is some authority[2] for believing that this mineral was imported from Guatemala and Xochonuchco, and ancient tradition points to the village of Tulla as a source.[3] It is almost certain, however, that part of it at least was obtained through trade from the Cerillos locality in New Mexico, which was extensively exploited in pre-Spanish time.

The mosaics were not ordinary ornaments. They had a symbolical meaning and were apparently confined to ceremonial application. They were the insignia of the Aztec gods, and, as such, were employed to adorn their representatives, both idols and priests. They had, moreover, a legendary significance, and tradition frequently attributed their use to the deities. The presents sent by Montezuma to Cortés included objects elaborately adorned in turquois mosaic; these gifts carried a special meaning in that they were the regalia dedicated to the memory of Quetzalcoatl, of whom Cortés was believed to be the reincarnation.[4]

Dental mutilation.—A peculiar custom of aboriginal America, and one most frequently practised in Central America and Mexico, was that of altering the shape of the teeth or modifying their appearance by the insertion of different materials. Several of the

[1] *Globus*, vol. 90, 1906, p. 322.

[2] Sahagun, book 11, edition of H. Siméon, p. 763. Hernandez, *Hist. Animalium et Mineralium Novæ Hispaniæ*, book 1, tr. 6, p. 90, cited by Lehmann, 1906, p. 319.

[3] See page 444.

[4] Sahagun, loc. cit., book 12, chap. 4. See also Nuttall, The Atlatl or Spear-thrower, *Peabody Museum Papers*, Cambridge, 1891, vol. 1, no. 3, pp. 21–23.

early Spanish historians refer to this fashion, and in the Catalogue of the Bishop Collection of Jade[1] is a reproduction of three teeth incrusted with green jadeite. A mythological personage known as Vukub-Cakix is described as possessing teeth incrusted with blue stones that shone like the face of the sky,[2] and this appears to refer directly to the use of turquois for adorning the teeth. That such was actually done is attested by an upper jaw-bone exhumed in 1882 from a sepulcher near Campeche in Yucatan, which bore six teeth inset with convex and polished turquoises of blue-green color.[3]

The Ancient Use of Turquois in the Southwest[4]

Use as Attested by Historical Evidence

Vague rumors reached the Spaniards of enormous riches to the north of Mexico, and toward the middle of the sixteenth century we find them turning their attention to this unknown and alluring region. In 1535 Cabeza de Vaca, with three companions, made an extraordinary journey from eastern Texas to Sonora on the Pacific coast,[5] which subsequently led to the discovery of New Mexico. Cabeza de Vaca was the first to note the use of turquois among the sedentary tribes. When near the Pacific coast he was made presents of turquois by the Indians. Among the Sierra Madre, about 90 miles east of the Yaqui river in Sonora, he found the Indians owning turquoises, and, inquiring whence they came, was informed that they were brought from the distant north where they were obtained in exchange for parrot plumes.[6]

In 1539 Fray Marcos de Niza, with a negro companion named Estevan, penetrated northward into the present New Mexico in

[1] *Investigations and Studies in Jade*, New York, 1906, vol. 2, p. 101.

[2] Bourbourg, *Popol-Vuh*, Paris, 1861, quoted by Boman, *Antiquités de la région Andine*, etc., Paris, 1902, vol. 1, p. 583.

[3] Hamy in *Bull. Soc. d'Anthr. de Paris*, vol. 5, 1882, p. 884, figured. This object is also described by the same writer in Décades américanæ, *Mem. d'arch. et d'ethn. américaines*, déc. III, no. 28, p. 92.

[4] This term is used to include the plateau region now comprising Arizona and New Mexico, and adjacent parts of Mexico, California, Nevada, and Colorado.

[5] Bandelier, *Contributions to the History of the Southwestern Portion of the United States*, Cambridge, Mass., 1890.

[6] Ibid., pp. 42, 61.

search of the "Seven Cities of Cibola".[1] While his account of the adventuresome journey is exaggerated as to detail, it is in the main reliable. He found the natives of the region valuing turquois as ornaments and using it for exchange. He was impressed by the great number of turquoises worn by the Sobaipuris of the Rio San Pedro in southern Arizona, the last region inhabited by village Indians before Zuñi was reached.[2] The natives along his course gave Fray Marcos presents of turquois and ox-hides.[3] Nearing Cibola he reached a village on the edge of the desert, where the inhabitants wore turquoises suspended from the ears and nostrils; these ornaments were called *cacona* and the wearing of them *casconados*.[4] Many turquoises were offered the friar, who was told that these gems abounded in Cibola as well as in the kingdoms of Marata, Acus, and Tontonteac.[5] Estevan, who had shown undue zeal in collecting turquoises,[6] had been sent ahead to Cibola, where he became involved in difficulties with the Indians and was killed. Niza followed and found that the people of Cibola "have emeralds and other jewels, although they esteem none so much as turqueses wherewith they adorn the walls of the porches of their houses, and their apparel and vessels; and they use them instead of money through all the country."[7] Niza took formal possession of Cibola and returned to Mexico, where he gave a glowing account of the riches of the new country. A force was then raised under Coronado and dispatched to conquer Cibola.

In 1540 Coronado visited the newly discovered country of Cibola, and reported that Niza had enlarged upon the richness of the place and denied that the houses were decorated with tur-

[1] A group of pueblos, now in ruins, centering about the present pueblo of Zuñi.

[2] Bandelier, *Contributions to the History of the Southwestern United States*, Cambridge, 1890, p. 442.

[3] Extracts from journal of Fray Marcos de Niza, published in the Indian Report by Lieut. Whipple, *Pacific R. R. Expl. and Surv.*, vol. 3, pt. 3, 1856, pp. 105–108.

[4] Davis, *Spanish Conquest of New Mexico*, 1869, p. 125.

[5] Ibid., p. 125. Marata has been identified as the ruined Makyata near Zuñi; Acus as the pueblo of Acoma; and Tontonteac as the Tusayan or Hopi province, northwestward from Zuñi. See Winship, The Coronado Expedition, *14th Ann. Rep. Bur. Amer. Ethnol.*, 1892–93, pt. 1, p. 357.

[6] Winship, loc. cit., p. 357.

[7] Marcos de Niza in Whipple's *Report*, 1856, loc. cit.

quoises.[1] However, he noted that the natives possessed turquoises of good quality, as well as "turquois earrings, combs and tablets set with turquoises";[2] and he further observed that they sometimes offer turquoises in their worship, which is principally of water.[3] When Coronado had occupied Cibola he heard of Tusayan (the present Hopi pueblos) and dispatched Don Pedro de Tobar to capture its villages. After a brief fight, in which the natives were defeated, the latter sued for peace, offering gifts including turquoises.[4] Somewhat later Alvarado was dispatched by Coronado on a short journey past Acoma to Cicuye (the present Pecos), where he was presented with cloth and turquoises, "of which," he reported, "there are quantities in that region."[5]

In a letter[6] from Mendoza to the King of Spain, written in 1540, it is observed that the people of Cibola have turquoises in quantity, though not so many as Marcos de Niza at first affirmed. Castañeda,[7] who accompanied Coronado to Cibola, referred to the custom in Culiacan (Sinaloa) of making presents of turquoises to the devil and of decorating certain classes of women with bracelets of fine turquoises. According to Bandelier[8] the Seri of Sonora, in early Spanish time, exchanged iridescent shells from the Gulf of California for the turquois of Zuñi; and the Opata gave parrot skins and plumes to the people of Zuñi in return for turquois and turquois ornaments. The Apache between the years 1630 and 1680 were accustomed to come to the pueblo of Pecos to trade in

[1] Coronado, Extracts from journal, published by Lieut. Whipple in *Pacific R. R. Expl. and Surv.*, vol. 3, pt. 3, 1856, pp. 108–111. According to F. H. Cushing the custom of adorning the porches of the houses with turquoises is supported by tradition.

[2] Ibid.

[3] Winship in *14th Ann. Rep. Bur. Amer. Ethnol.*, 1892–93, p. 573. In Smith's *Relación de la Jornada de Coronado á Cibola* (*Colección de Documentos para la Historia de Florida*, London, 1857, vol. 1, p. 148) it is stated that the people of Cibola offered turquoises of poor quality in sacrifice to their springs. This custom of devoting offerings to the sources of water was widespread among the Pueblo Indians. See Hough, Sacred Springs of the Southwest, *Rec. of the Past*, vol. 5, 1905, pp. 163–169.

[4] Castañeda's narrative in Winship, loc. cit., p. 489.

[5] Ibid., p. 491.

[6] Translated in Winship, loc. cit.; see p. 549.

[7] Narrative, in Winship, loc. cit.; see p. 513.

[8] Bandelier, *Final Report of Investigations among the Indians of the Southwestern United States*, Cambridge, 1891, pt. 1, p. 39; also p. 63.

turquois.[1] The Yaqui in former times held the turquois in place of money.[2] The Tano during the 16th century owned the Cerillos turquois deposits in New Mexico and guarded them jealously,[3] and the turquois obtained therefrom proved quite an important resource for purposes of commerce.

There is little evidence that turquois was used in Spanish times by tribes living to the north and east of the Pueblo region. It is stated in one place,[4] however, that in the region of the lower Mississippi the Spaniards saw shawls of cotton, brought, it was said, from the west, and probably from the Pueblo country, as they were accompanied by objects which from their description may have been of turquois. More than one hundred minute discoidal beads and a small pendant of turquois, believed to have been derived through trade with the Pueblos, were found with the skeleton of a child in a mound in Coahoma county, Mississippi.[5]

Use as Attested by Objects

Throughout the Southwest turquois ornaments of various kinds have been found in comparative abundance in graves and ruins. Bandelier[6] noted turquoises which came from the ruins of Casas Grandes, in Chihuahua, Mexico. Kunz[7] describes and figures two objects found by F. H. Cushing near Tempe, Maricopa county, Arizona. The first of these is a prairie-dog carved from white marble, with turquois eyes; the second, a sea-shell incrusted with mosaic of turquoises and garnets (?), fashioned to represent a frog.[8]

[1] Vetancurt, *Teatro Mexicano*, Mexico, repr. 1870–71, vol. 3, p. 323.

[2] Bancroft, *Native Races of the Pacific States of North America*, New York, 1874, vol. I, p. 583.

[3] Bandelier, *Final Report*, etc., loc. cit., 1890, pt. I, p. 163.

[4] Holmes, Prehistoric Textile Art of Eastern United States, *13th Ann. Rep. Bur. Amer. Ethnol.*, 1891-92, p. 25.

[5] Peabody, Exploration of Mounds, Coahoma County, Mississippi, *Peabody Museum Papers*, Cambridge, 1904, vol. III, no. 2, pp. 50-51.

[6] *Final Report of Investigations among the Indians of the Southwestern United States*, Cambridge, 1890, pt. I, pp. 39, 352.

[7] *Gems and Precious Stones*, New York, 1890, p. 61.

[8] The incrusted frog referred to by Kunz was not found, but was a model of one in possession of Mr Lincoln Fowler, of Phœnix, Arizona, the source of which was one of the ruins in the Salt River valley.—*Editor.*

Blake has referred to a mosaic of turquois dug from the ruins near Casa Grande on the Gila river,[1] and an ancient cross of clam-shell bordered with turquois mosaic from a cliff-dwelling on Oak creek,[2] near Jerome, Arizona. In the latter locality Fewkes[3] found some beads in the Honanki cliff ruin, near Oak creek. According to Blake,[4] also, the ruins of the Salt River valley in Arizona have yielded many turquois beads and pendants, formerly used for necklaces, and a marine shell incrusted with turquois.

In 1896 some interesting finds of turquois objects were made by Fewkes[5] in the ancient pueblo ruins near Winslow, Arizona. The most important of these is a beautiful ornament of shell incrusted with turquois,[6] found at Chaves Pass, on the breast of a skeleton. It consists of one valve of *Pectunculus giganteus*, coated with gum, in which are inlaid rows of green turquois slabs carefully fitted together, the object representing a frog or a toad. The near-by ruins along Chevlon creek, a tributary to the Little Colorado, likewise furnished turquois ornaments, including a square fragment of lignite, inlaid with five small turquoises; a pear-shaped pendant of bone covered on one surface with turquois mosaic; an armlet of shell inlaid with turquois; and an object of shell and turquois combined in an incrustation on wood. Of the dress of the ancient Patki people who formerly inhabited these ruins, Fewkes[7] says:

"For ornaments they wore shell, bone and turquois variously worked. The most elaborate forms of these ornaments were shell and turquois incrustations on wood, shell, lignite or bone. . . . The women had ear-pendants made of rectangular fragments of lignite set with turquois, bone incrusted with the same, or simple turquois. Both sexes had armlets, wristlets and finger rings made of the marine shell *Pectunculus giganteus*, sometimes inlaid with stone."

From the Black Falls ruins, on the Little Colorado, about 35

[1] *Amer. Jour. Sci.*, vol. 25, 1883, pp. 197–200.

[2] *Amer. Antiquarian*, vol. 22, 1900, pp. 108–110.

[3] *17th Ann. Rep. Bur. Amer. Ethnol.*, 1895–96, p. 573.

[4] *Amer. Antiquarian*, vol. 21, 1899, pp. 278–284.

[5] *Ann. Rep. Smithson. Inst.*, 1896, pp. 517–539.

[6] Figured in colors in the publication cited, p. 529. Also described in *American Anthropologist*, vol. 9, 1896, pp. 359–367.

[7] Loc. cit., p. 534.

miles northeast of Flagstaff, Fewkes obtained an interesting pair of ear-pendants, made of lignite slabs, upon which are cemented small squares of turquois and lignite, arranged in simple though attractive geometrical design, with a slab of yellow indurated clay in the center.

Farther north, in the Sikyatki ruin in the Tusayan province, many turquois objects have been unearthed[1] during the course of archeological excavations. The ancient Sikyatki people buried their dead with the ornaments worn while living, and their skeletons were frequently found with rows of turquois beads about their necks and single pendants near the mastoid process, indicating that the bodies had been decorated with necklaces and pendants. A food vessel collected from the Sikyatki ruin is decorated with the painted head of a woman wearing square ear-pendants of turquois mosaic, similar to those worn by the Hopi women of today. A pair of similar earrings consisting of flat slabs of wood, with one side covered with tiny squares of turquois set in hardened pitch, has been found by Cummings[2] in the Betatakin ruin, a well-known cliff-dwelling near Marsh Pass in northwestern Arizona.

Turquois beads and ear-pendants are frequent in the ruins of northwestern New Mexico and the adjacent region.[3] In 1899, George H. Pepper found many turquois carvings and some imperfect mosaics in ruins in the Mancos cañon,[4] in the southeastern corner of Colorado. Of special interest were tadpoles from ¼ to 1 inch in length, fashioned of turquois and perforated for suspension as pendants; and frogs nearly 3 inches long made of black jet, with raised eyes of turquois and a band of the same material back of the eyes. The turquois was mostly of a rich green, though some pieces were partly bluish. Dr J. Walter Fewkes[5] has seen a beautiful bird mosaic, inlaid with turquois, from one of the ruins near Cortez in the Montezuma valley, not far from Mancos. This object is made of hematite, with turquois eyes and neckband. The

[1] Fewkes in *17th Ann. Rep. Bur. Amer. Ethnol.*, 1895–6, pp. 641, 662, 733.

[2] *Bull. Univ. Utah*, 1911, vol. 3, no. 3, pt. 2, p. 35.

[3] Bandelier, *Final Report*, loc. cit., p. 352.

[4] Kunz in *21st Ann. Rep. U. S. Geol. Surv.*, 1899–1900, p. 456.

[5] Bur. Amer. Ethnol., *Bull. 41*, 1909, p. 27.

feathers are represented by stripes of inlaid turquois, and upon the back is an hour-glass figure, also in turquois inlay, recalling designs in ancient pottery. A single specimen of turquois, probably an ear-pendant, was found in the Cliff Palace ruin in the same region.

The most important series of turquois objects yet found in this country, however, was the result of explorations made in 1896 by George H. Pepper[1] in the ancient Pueblo Bonito of Chaco cañon, northwestern New Mexico. Mosaics, carvings, beads, and pendants in great quantity and variety were found in the burial rooms and accompanying the skeletons of the former inhabitants. A few may be described. One of the objects is a "bone scraper" formed of the humerus of a deer or an elk and decorated about its center with an inlay of jet and turquois, showing considerable taste and skill in execution and design. Another is a head or breast ornament, made of polished jet, its four corners set with circular turquoises. Another jet object is designed to represent a frog or a toad; its body is carefully rounded and polished; the eyes are two large rounded pieces of turquois standing boldly out, and across the neck is a broad inlaid band of the same material.[2] A suite of eight duck-like birds, carved from decomposed turquois, of pale bluish-green color, were prominent among the finds. The figures were probably roughed-out with a stone implement and then ground to the desired shape with sandstone grinders. In addition, the ruins yielded a quantity of turquois pendants and discoidal beads, mostly green in color; one pendant, however, showed a delicate blue.

One burial room in particular has served as the subject of a special paper by Mr Pepper,[3] and the number and variety of turquois ornaments found therein is remarkable. About the neck, breast, waist, wrist, and ankles of several of the skeletons, turquois beads to the number of several thousand were encountered, together with pendants and carved pieces. Near one of the bodies

[1] *American Anthropologist*, vol. 7, 1905, pp. 183–187.

[2] Among the Pueblo Indians of today, as well as among the ancient inhabitants of the Southwest, the frog is a symbol of water, and its conventionalized design is common in both the ancient and the modern art.

[3] The Exploration of a Burial-room in Pueblo Bonito, New Mexico, *Putnam Ann. Vol.*, New York, 1909, pp. 196–252.

was a "turquois jewel-basket" of cylindrical shape, 3 inches in diameter and 6 inches long, consisting of slender splints, over which a mosaic of turquois slabs had been cemented by means of piñon gum. The basketwork had decayed, but the mosaic was held in place by the sand in which the object was buried. One thousand two hundred and fourteen pieces of turquois had formed the mosaic, and within and near the mouth of the cylinder were found 2150 disk-shaped turquois beads and 152 small and 22 large turquois pendants, some carved to represent birds. Among thousands of other objects of turquois there may be noted the following: A stone ornament with inlay of turquois; another object made of turquois and shell mosaic inserted on basketwork, the beads being strung and placed on edge in parallel rows; a pendant with turquois front and trachyte back, showing splendid workmanship; several beads with holes smaller than an ordinary pin; a number of tadpoles, frogs, and buttons of carved turquois, drilled on the underside for suspension; a pear-shaped ornament made of three turquois pieces joined with great exactness; a cylinder of hematite ornamented with turquois inlay, representing a bird; a mouthpiece for a shell trumpet incrusted with turquois; pendants of various shapes and sizes; beads, ornaments, and inlays in great variety.

Pepper[1] states that this burial chamber probably contained the remains of priests, caciques, or other important personages, and that the objects show a high degree of skill and taste, and "afford conclusive evidence that the people of Pueblo Bonito reached as high a degree of proficiency in the arts as those of any other pueblo in the Southwest."

Recent and Present Use of Turquois in the Southwest

The turquois is today in wide use among the Indians of the Southwest, and it forms one of their most cherished possessions. As in the past, it still finds a ceremonial as well as an ornamental application.

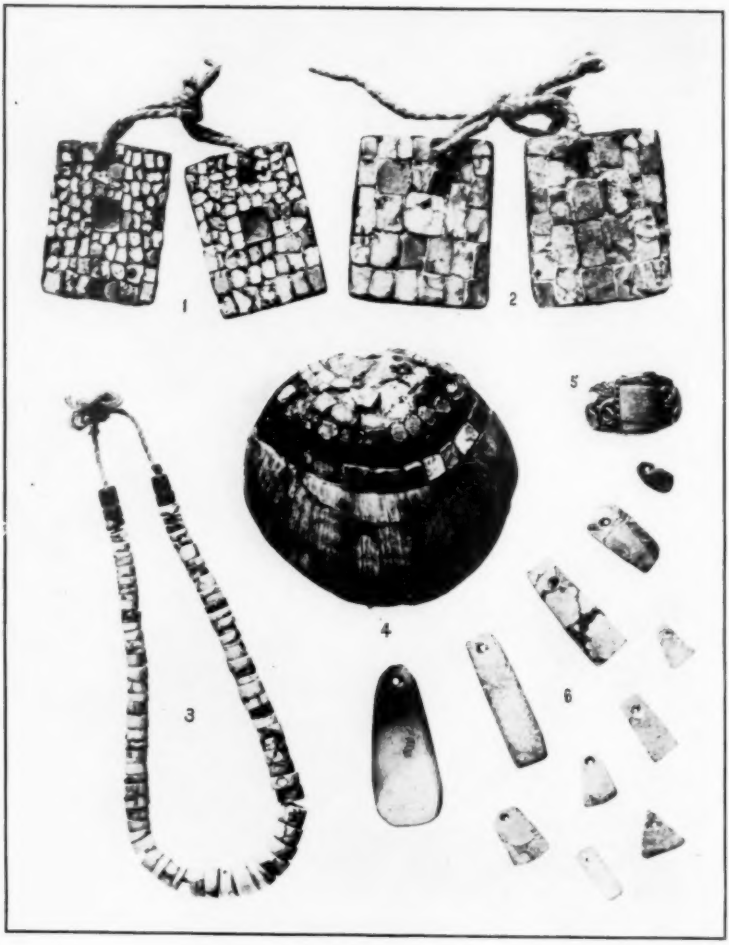
Pueblo-dwelling tribes —The Pueblo Indians find great pleasure in turquois and seldom is a well-to-do representative seen without

[1] Ibid., pp. 251-252.

ornaments of this material. Especially upon gala occasions and during ceremonies is this stone in evidence, and both sexes bedizen themselves with quantities of it. The turquois is most commonly fashioned into discoidal and cylindrical beads and into various sized pendants of oblong, triangular, and keystone outline. The work is performed by rubbing the material on sandstone and polishing on finer material, and the objects are perforated with a bow-drill, usually tipped with a fragment of quartz or of flint. The workmanship is rather crude, and the finished piece is seldom symmetrical or highly polished. The beads are strung usually on a cord, but sometimes on wire, and one or more strands are used for necklaces, bracelets, and more rarely as ear-ornaments. Discoidal beads are the most common (see pl. XXXII, 3); at times these alternate with cylindrical shapes, and pendants may be inserted, especially toward the center, to give variety. Beads of coral and white shell are often combined with the turquois, although their introduction lessens the value of the string. Pendants are frequently worn alone, suspended from the ears; indeed, this is perhaps the most common ornament seen in the Southwest. A number of pendants of Sia workmanship shown in pl. XXXII, 6, illustrate the customary shape and appearance of these objects. Finger-rings are sometimes set with turquois, and the mineral is frequently used for purpose of currency. Furthermore, the turquois is employed, though not so universally, for inlaying ornaments and objects of utility, and in some instances small slabs of this material are fashioned into mosaics of beauty, though not equal to the superb examples made of old by the Aztecs.

In addition the turquois finds application by virtue of its supposed efficacy, and consequently it is prominent in many charms, amulets, and fetiches. Few religious rites take place without its use, and the paraphernalia of the priesthood abounds in objects adorned with it. Indeed turquois may be said to hold a fundamental place in the religious ideas of the Pueblo Indians and in their outward ceremonial expression of them.

The turquois utilized varies from very inferior material to really beautiful stones. The majority, however, are of little value as



INDIAN TURQUOIS ORNAMENTS

1. Zuñi ear pendants in turquois mosaic. 2. Hopi ear pendants in turquois mosaic. 3. Pueblo necklace — turquois, coral, and shell beads. 4. Zuñi ornament — shell inlaid with turquois. 5. Navaho ring of silver set with carved turquois. 6. Pendants of turquois, Sia workmanship. All of these objects are in the United States National Museum.

gem material, according to our standards. Turquois matrix is used along with pure material, although the latter is preferred. The Indian is usually a rather keen judge of quality, although he does not so strongly favor the blue color, to the exclusion of the green, as does the white man.

The Zuñi value the turquois more highly than does any other Pueblo tribe, with the possible exception of the Hopi. A single string of beads of good quality is said to be worth several horses. In former times the Zuñi necklaces were more carefully made than they are today, and numbers of them, worn only on ceremonial occasions, have been handed down from father to elder son for several generations.[1] Two red shells inlaid with turquois and worn pendent to the necklaces during certain religious rites were in possession of the Zuñi from early time; recently Mrs M. C. Stevenson succeeded in obtaining one of them for the United States National Museum. (See pl. XXXII, 4.) According to Mrs Stevenson, double loops of turquois beads are worn by the Zuñi in the ears only on ceremonial occasions; at other times they are worn pendent to necklaces. Beautiful mosaics consisting of thin pieces of turquois cemented to wooden slabs are sometimes suspended from the ears. A good example, with a piece of abalone shell in the center, is shown in pl. XXXII, 1. In the United States National Museum is a Zuñi cradle with a small turquois inset in a position that would come beneath the heart of the occupant. Many Zuñi fetiches, particularly such as were supposed to be efficacious in the chase, have pieces of turquois attached to them.[2] Some are fashioned of stone in crude animal shapes, with inlaid eyes of turquois. An example of particular interest in the United States National Museum is made of sandstone, dipped in blood, and not only are its eyes of turquois, but several irregular slabs of this material are inset at intervals over the body.

The most characteristic adornments of the Hopi are the mosaic ear-pendants worn by the women. These are very beautiful, and are made of thin slabs of turquois, nicely polished and cemented

[1] Stevenson, M. C., *Dress and Adornment of the Pueblo Indians.* Consulted in manuscript.

[2] Examples are displayed in the United States National Museum.

with piñon gum to a flat wooden base. An example is shown in pl. XXXII, 2. According to Fewkes,[1] the older mosaics of this description are much finer than the modern ones, some of which are made of reworked turquois, containing pieces previously perforated and used for beads. They have generally dropped out of use on the East Mesa of the Hopi domain, where they are preserved as heirlooms.[2] Necklaces, ear-pendants, bracelets, etc., are used in abundance by the Hopi. The men wear loop earrings similar to those worn by the Zuñi on ceremonial occasions. According to Mrs Stevenson[3] the Hopi in 1882 possessed several shell mosaics similar to one illustrated in pl. XXXII, 4. The Hopi have perhaps the most elaborate ceremonies of any Indian tribe, and the turquois figures in many of them. During the famous Snake Dance, each Antelope Priest is customarily adorned with shell and turquois necklaces.[4] The Walpi Warrior Society, in certain of its rituals, uses a jet snake with turquois eyes and other emblems adorned with turquois.[5] In several of the Hopi Katcinas, as described by Fewkes,[6] the figures are represented with ornaments of turquois, and many Hopi fetiches are frequently decorated with this material.

The Keres of Santo Domingo pueblo, New Mexico, wear beads of turquois strung on silver wire, and earrings of the same material.[7] Their medicine-men, in their ceremonies to induce rain, use a fetich of gypsum in the form of a prairie-dog, with eyes of turquois.[8] Kunz[9] mentions a large, flat, drilled turquois amulet that was employed as a charm by these Indians. Roughly ground, heart-shaped ornaments, drilled with a bow-drill with point of quartz or agate, have been sold to some extent by them.[10]

[1] *22d Ann. Rep. Bur. Amer. Ethnol.*, 1900–01, p. 86.

[2] Fewkes in *American Anthropologist*, vol. 9, 1896, pp. 359–367.

[3] *Dress and Adornment of the Pueblo Indians*, op. cit.

[4] Fewkes in *16th Ann. Rep. Bur. Amer. Ethnol.*, 1894–95, p. 282.

[5] Personal communication from Dr Fewkes.

[6] *21st Ann. Rep. Bur. Amer. Ethnol.*, 1899–1900, pp. 67, 86, 113, 119.

[7] Kunz in *Mem. Intern. Congr. Anthr.*, Chicago, 1894, pp. 267–281.

[8] In the United States National Museum there is a somewhat similar fetich from Sia, New Mexico, with body of gypsum and eyes of turquois, made probably to represent a bear.

[9] Kunz in *Mem. Intern. Congr. Anthr.*, op. cit.

[10] Kunz, *Min. Resources of the United States for 1883–84*, U. S. Geol. Survey, pp. 767–768.

Pima.—Among these Indians turquois is now rarely seen, though in the earlier days ornaments of this material were common.[1] Both sexes, but especially the men, wore strands of beads and pendants, usually of turquois and shell, suspended from the ear-lobes and the neck, while upon the arms of women and the right arms of men were often seen bracelets of similar material. A very brave man was accustomed to pierce the septum of his nose and wear suspended from it a bit of polished bone or else a piece of turquois or shell.

Navaho.—The wandering Navaho hold the turquois in no less esteem than do the neighboring pueblo-dwelling tribes, from whom they doubtless derived their fondness for this gem. Indeed they value their turquois ornaments above all other possessions, and their regard for this precious stone causes them to go to almost any extreme to obtain it. They are inordinately fond of personal adornment, and not uncommonly a single Indian will bedeck himself on special occasions with regalia to the value of several hundred dollars. In general, a man's position and wealth may be judged from the number of ornaments he wears.

A Navaho is seldom seen without ear-pendants and necklaces of turquois. The former are usually large pieces, roughly fashioned into keystone shape and polished, which are attached to the ears with cord; the necklaces consist of small, perforated, discoidal beads, from one-eighth inch in diameter upward, strung frequently for sake of variety with a few cylindrical beads and pendants or combined with beads of red coral and white shell. Occasionally a saddle-horn or a gun-handle will be studded with small knobs of turquois. The Navaho also are clever silversmiths, and the turquois is their favorite stone for setting in various objects of jewelry. Bracelets, buttons, buckles, belts, rings (see pl. XXXII, 5), plaques, and other ornaments are fashioned from Mexican pesos and

[1] Russell in *26th Ann. Rep. Bur. Amer. Ethnol.*, 1904–05, p. 112. An old military report of 1848 (Emory, *Notes of a Military Reconnoissance from Fort Leavenworth, in Missouri, to San Diego, in California*, Senate Ex. doc. 7, 30th Congress, 1st sess., 1848, p. 88) mentions that at that time the Pima and Maricopa Indians were accustomed to resort to near-by ruins after rains to search for trinkets of shell and a "peculiar green stone" (the turquois).

American silver pieces, and frequently inlaid with roughly polished pieces of turquois. According to Mrs Stevenson,[1] the first setting of turquois in silver was done in 1880, after which the Navaho became much interested in this type of work. The Zuñi soon followed their example, and both tribes have produced interesting specimens, although the Navaho excel the Zuñi in originality of design.[2]

The turquois passes as currency with the Navaho. He will pay a high price for a desirable stone, and although he has no definite idea of its exact value, he cannot be imposed on with a poor, inferior stone. A Navaho herder was seen on one occasion to buy $125 worth of turquoises at a trading-store after disposing of about $300 worth of wool to the trader.[3] Much of the turquois in use is of various shades of green, but occasionally a fine blue stone is seen, and this is particularly valued by the Indian. In rare instances a small turquois of good color is obtained from one of the cliff-ruins in which the region abounds, and upon such a specimen the Navaho places a particularly high value, refusing to sell it under any circumstances, for he realizes that its color has been tested by centuries and will not fade.

In addition to its ornamental use, the turquois figures in many Navaho rituals and possesses a religious significance. It is used in the Mountain Chant[4] and the Night Chant,[5] two of the most important Navaho ceremonies. Certain sacred objects of ceremonial application are customarily painted blue with powdered turquois.[6] The mineral is commonly called *chalchihuitl* and pronounced chal'-chi-we-te by the Navaho.[7]

Other tribes.—The Apache values the turquois and calls it

[1] *Dress and Adornment of the Pueblo Indians*, op. cit.

[2] Ibid.

[3] Sterrett, *Min. Resources for 1911*, U. S. Geological Survey.

[4] Matthews in *5th Ann. Rep. Bur. Ethnol.*, 1883–84.

[5] Matthews in *Mem. Amer. Mus. Nat. Hist.*, Hyde Expedition, 1902.

[6] Matthews, The Mountain Chant, in *5th Ann. Rep. Bur. Ethnol.*, 1883–84, p. 421.

[7] Blake in *Amer. Jour. Sci.*, vol. 25, 1858, p. 227. Also according to personal communications of Mr F. W. Hodge and Dr Walter Hough, who inform me that this Mexican term is commonly employed to designate the stone by the Southwestern Indians. It was the writer's experience that the turquois was also termed "*doklisi*" by the Navaho. The Zuñi name is '*hli'akwa*.

duklij ("blue, or green, stone," these two colors not being differentiated in their language). The Apache medicine-man is almost invariably provided with some of this mineral, which is supposed to have unusual virtues. It has long been in use in this manner, for according to Bourke,[1] "it was the Apache medicine-man's badge of office, his medical diploma, so to speak, and without it he could not in olden times exercise his medical functions."

The Ute are stated to prize the turquois as highly as do the Navaho.[2] Their congeners, the Paiute, use the turquois in much the same manner as do the Navaho, but care less for it.

Discussion of the Use of Turquois

The portion of North America wherein the turquois has found application among the aborigines is sharply limited on the one hand by the Isthmus of Panama, and on the other by a line drawn eastwardly from the Pacific coast through southern Nevada and Colorado, thence southward through Texas to the Gulf of Mexico. This is, of course, due to the fact that the American deposits of turquois, except two of little importance,[3] are confined to this area. Rarely, however, has the dependence of use upon occurrence been so well exemplified. It indicates, too, the lack of communication between the pueblo-dwelling tribes of the Southwest and the other Indians of the United States.

The aboriginal use of turquois can be further analyzed as due to three principal reasons. Firstly, the mineral occurs upon and near the surface, so that deposits thereof are easily located and readily worked with crude appliances. Secondly, turquois is comparatively soft and lends itself to primitive methods of shaping, that would make no impress upon the harder stones. And thirdly, the color of the turquois, ranging from the blue of the sky to the green of water and plants, seems to make a strong psychological

[1] The Medicine-men of the Apache, *9th Ann. Rep. Bur. Amer. Ethnol.*, 1887–88, pp. 588–591. It should be mentioned that Bourke calls the *duklij* malachite, but his description and allusions leave no doubt that turquois was meant.

[2] Pepper, 1909, loc. cit.

[3] In Alabama and Virginia.

appeal to uncivilized peoples, peculiarly fitting their religious ideas and constantly suggesting a symbolical application.[1]

The individual sources of both the ancient and the modern turquois are numerous. Most of them are now known to the whites, although it is believed that certain tribes still obtain stones from localities known only to themselves. The present-day Indians, however, carry on little systematic mining for turquois, obtaining their material through barter with other Indians or by purchase from white traders. They utilize also quantities of turquoises handed down from their fathers. It is a striking circumstance that in America there are no turquois deposits of importance that do not exhibit signs of prehistoric exploitation. At Los Cerillos, New Mexico, in particular, are immense excavations dating from pre-Spanish times. The source of the turquois used by the ancient Indians of the Southwest is therefore apparent. To trace the source of the turquois used in Mexico and Central America is more difficult. No occurrence at all adequate as an important source has been discovered south of the present Mexican boundary. It therefore seems probable that the Aztecs, at least, through trade with tribes to the north, obtained supplies of turquois which came from the Cerrillos hills and perhaps other localities of the Southwest.

ACKNOWLEDGMENTS

In conclusion the writer wishes to acknowledge his great indebtedness to Dr Walter Hough for constant advice and help during the preparation of this paper. He also takes pleasure in thanking Dr J. Walter Fewkes and Mr F. W. Hodge for information and suggestions.

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[1] In the development of the color-sense, blue is the last of the pure spectrum colors to be distinguished. (See Goldschmidt, *Ueber Harmonie und Complication*, Berlin, 1901, pp. 97–104.) The fondness for blue, once formed in primitive people, seems to be a strong one.

THE KITSELAS OF BRITISH COLUMBIA

By GEORGE T. EMMONS

WHERE the Skeena river breaks through the eastern barrier of the Coast Range in British Columbia, 75 miles from its mouth, the pent-up waters have cut a deep cañon upward of a mile and a half in length, impassable during the spring and summer freshets and fraught with danger at all seasons. It is the most justly dreaded inland waterway of the Northwest, for, aside from the tremendous force of the contracted river over an uneven rocky bottom, forming great swirls and riffles, the upper entrance is obstructed by two high, narrow, rock ridges that divide the waters, forming two narrow channels at all stages and a third at extreme high water. The walls on either hand are precipitous or strewn with immense bowlders to a height of from 50 to 100 feet, where narrow benches slope back from them to the mountains 3000 to 4000 feet in altitude.

This mountain gateway marks approximately the climatic line of demarcation between the flora and the fauna of the littoral and of the interior. The warm, moisture-laden, ocean atmosphere that drives in through Dixon Entrance is carried up the river valley by the prevailing westerly winds, and in the drying-out process of condensation in contact with the lofty, snow-covered mountains, is precipitated in continual mist and rain that induce an almost tropical growth of underbrush and account for the forests of great spruce, cedar, hemlock, and cottonwood that cover the bottomlands and climb the mountain sides to the limit of tree life.

Passing up the river, above the cañon, the effect of the drier, colder climate is manifest in the shrinkage of the conifers and the open woods of birch, alder, willow, and poplar, and the scantier vegetation and new species.

In like manner certain animals range through one or the other district only—as the little-known white bear (*Ursus kermodi*) of

the Tsimshian peninsula and adjacent islands, the great brown bear and the black-tail deer of the coast region, that later give place to the grizzly bear, the caribou, and the mountain sheep, while lynx, rabbit, and fox increase in number. At best, however, the valley of the Skeena is very poor in animal life, and the inhabitants have always looked to the river with its wealth of salmon for their chief support. The natives named this part of the river cañon *Dsilasshoo*, and those who lived here as *Gitdsilasshoo*, "people of the cañon," but this is now written officially *Kitselas*. They were of Tsimshian stock, but were intermediary between the Tsimshian proper who had their summer fishing villages on the river and lived at Metlakatla during the winter season, and the Kitikshan of the upper river who claim to be the parent stock from which both the Tsimshian and the Nishka have descended.

The Kitselas lived here permanently and held the cañon, claiming the river valley from Lorn creek above to the little cañon below. They were not permitted to descend the river for trading purposes below the first fishing village of the Tsimshian, and in like manner they restricted the Kitikshan to their country above the cañon. This position of middlemen was their life, for while their food supply of salmon was sufficient, their narrow strip of river country was poor in every other product.

There were four villages here, two on either side, at or near the head and foot of the cañon; and judging from what remains to mark their sites they must have been of fair size. Mr Hickey, of the Hudson's Bay Company, who passed through here in 1870, estimated the population at about one thousand. They were then living in primitive simplicity, in communal houses of medium size, of hewn timbers, with a central fire space and with smoke-hole in the roof. Carved heraldic columns marked the dwellings of the clans. The people dressed in skins and furs, and such blankets as they received in trade from the coast people. When they procured trousers they cut them off above the knees, using only the lower parts as leggings.

At the foot of the cañon, on the northern bank, just above where the river spreads out, forming an extensive bight with a shelving

beach, was the village of Tsune-ee-yow, "landing place," so named from its accessibility, where canoes bound upstream could land at any stage of the water. The extent of the clearing encumbered with fallen and decaying timbers would indicate a settlement of considerable size.

Almost a mile above this, on the same shore, well within the cañon and just below where the separate channels unite, marked by the usual growth of berry bushes that take possession of old dwelling sites, are several rude poles and a deserted house that alone remain of the village of Kit-lah-soak, named from the bottom boards of the canoe that were taken—really, "people of the place when they steal the canoe bottom-boards." This would seem to have been the smallest of all the cañon villages—a reasonable conclusion from its inaccessibility by water at certain stages of the river.

On the southern shore, a short distance below the mouth of the cañon, where the river regains its usual width, was Kit-ousht, "people of the sand bar," where in former days the wash of the upper river formed an offshore shoal. From the level ground, the low shore, and the good water this was the most favored site, and it is claimed that it was a considerable settlement, but nothing remains to indicate its former greatness save the numerous axes, hammers, and parts of other stone implements dug up in the process of gardening and building. The only native remaining at the cañon lives at this place. The white village of Kitsela is situated here.

At the head of the cañon, on the southern shore, on a narrow bench extending along the dry channel, was Kit-lth-sahok, "people at the edge of the lake," or "people of the shore," for it is claimed that when the river was at a much higher level, before the present channels were formed, the waters at this point spread out as a great lake. Here the most extensive and interesting remains are found. The houses have generally fallen to decay, but the structural posts and beams in one old house 36 feet square show much ingenuity and careful workmanship in mortise, tenons, and dowel pins, without the use of metal. One feature of roof construction

different from anything I have seen, either among the Tsimshian of the coast or the Kitikshan of the upper country, is a heavy tree-trunk ridge-pole supported in the hollowed-out heads of two upright posts that gave the pitch to the roof by taking the upper ends of the rafters, the lower ends resting on the longitudinal framework of the walls. The forward end of this ridge-pole, which projected several feet beyond the house-front, was carved to represent the head of a salmon. The houses showed no signs of excavation, and like those of the Kitikshan were floored at the level of the ground. There remained standing in 1910 three old, slender totem-poles, or heraldic columns, which were rounded from base to summit and showed no evidence from chambers in the back that they were used as mortuary columns for the reception of the ashes of the cremated dead. These carvings are crude in comparison with either those of the coast or of the upper river, and would indicate either the poverty or the want of artistic sense of this people.

In the accompanying plate XXXIII, the totem-pole shown in *a* is carved to represent a beaver sitting up at the base, above which the rounded pole is ornamented in encircling series of parallel grooves indicating the marks of the beaver's incisors.[1]

The pole shown in *b* is more elaborate; it shows at the base a frog, and above a mythical four-fin killer-whale, the tail carved to represent a human figure. Adjoining are the remains of the old communal house, with ridge-pole carved in the form of a salmon.

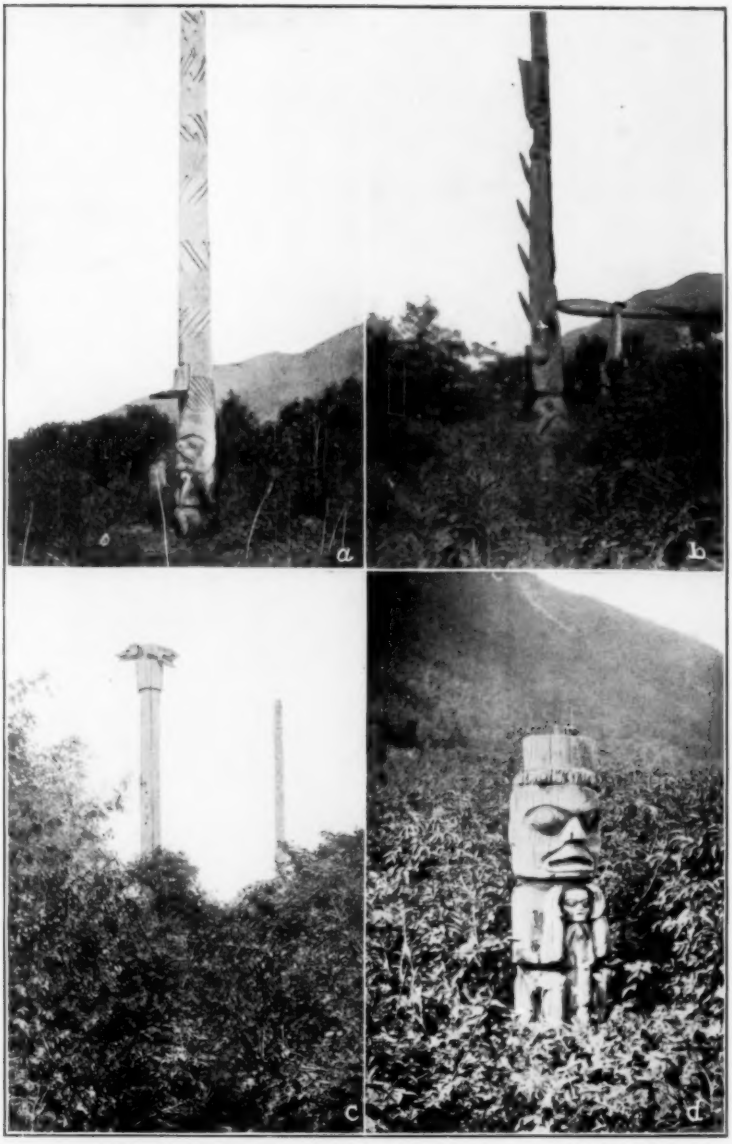
Figure *c* of the plate is a plain, rounded column surmounted by a wolf figure.

Only the base of the pole shown in *d* now remains; it is a human figure seated and inclosing a smaller figure.

The decayed remains of other carvings and house-timbers half-buried in the moss and overgrown with brush confirm the statement of the natives that this was the largest and most important of the villages hereabouts.

It must not be inferred from this scene of destruction and the

[1] The small projecting shelf above the figure contains a trespass notice requesting that the post be not disturbed, as it is private property.



HERALDIC COLUMNS, OR TOTEM POLES, OF THE KITSELAS

disappearance of the inhabitants that the Kitselas have ceased to exist. They have greatly decreased in numbers since their contact with the whites, and constitute but a remnant of their former strength. After the American gold discovery, when thousands of prospectors traversed the river, and the later navigation by steamboats and the planting of trading-posts at Hazelton, their position as middlemen was destroyed, as they could not compete with the white man, and, losing the trade of the Kitikshan, who naturally resorted to Hazelton, they had nothing left but the salmon in the water, as their narrow strip of river valley was almost destitute of animal life. Prior to this the Tsimshian of Metlakatla, who held the lower river and barred their passage to the sea, had removed to Fort Simpson, and with accumulated wealth and decreased numbers they became indifferent to the river travel, so that when the salmon canneries were established on the coast and the demand for fishermen increased, many of the Kitselas removed to Port Essington, where they are found today but so intermixed with others that their number can not well be determined. Those who remained longer in their old homes have moved down the river 4 miles, and have built a straggling village of eight small modern houses which they call An-dee-dom (from the noise made by stepping on a pebble shore), but which is commonly known as Newtown. Its population is about 60.

With the building of the Grand Trunk Pacific railway along the river the last vestiges of the older native life will rapidly disappear and the few people who survive the changed conditions will have little or no knowledge of the past. For this reason I offer these notes of two visits to Kitselas in 1909 and 1910.

PRINCETON, NEW JERSEY.

TEWA RELATIONSHIP TERMS

By JOHN P. HARRINGTON

THE Tewa-speaking Pueblo Indians occupy at present five villages northwest of Santa Fé, New Mexico, and one village in northeastern Arizona. Each village has its peculiar dialect, but the dialectic differences are very slight. The notes embodied in this paper were obtained at the villages of San Ildefonso, Santa Clara, San Juan, and Nambé, all near Santa Fé. The writer acknowledges his deep indebtedness to Miss B. W. Freire-Marreco, whose study of the social and governmental organization of the Tewa has given her a rare insight into the Tewa customs of expressing relationship and the like.

No other set of relationship terms of Southwestern Indians has been studied in which the classificatory system is so little developed as in Tewa. The writer believes that in the common talk of the Tewa Indians more descriptive terms denoting relationship are used than even in our highly analytic English system.

The peculiar use of postjoined 'ɛ in many of the terms is worthy of further attention than can be given to it in the present paper. It appears that nothing like it has been discovered in any other Southwestern language. The original meaning of 'ɛ seems to be 'offspring,' 'son,' 'daughter.' Postjoined to any term denoting blood-relationship with the exception of *tara* 'father', *jija* 'mother', and *mæ'ᴲmæ* 'male cousin', it gives what the younger of two relatives by descent calls the elder by descent. Thus: *naɓi t'ɛtɛ*, 'my grandfather', ... response: *naɓi t'ɛtɛ'ɛ*, 'my grandchild'; *naɓi sa'ᵃja*, 'my grandmother', ... response: *naɓi sa'ᵃja'ɛ*, 'my grandchild.' *tɥ'ᴵᵘnɥ*, 'uncle,' forms *tɥ'ɛ*, 'nephew or niece of an uncle,' not *tɥ'ᴵᵘnɥ'ɛ*, as we should expect. *tara'ɛ* and *jija'ɛ* are merely familiar forms of *tara* and *jija*, 'father' and 'mother,' like German *Väterchen* and *Mütterchen*, although we have regularly enough *naɓi kwatara'ɛ*, 'my stepchild,' said by a father, and *naɓi kwajija'ɛ*, 'my stepchild,'

said by a mother. With this system of nomenclature it is interesting to compare such English usages as when a child says: "Auntie!" and its aunt answers, "O you dear Auntie's child!" Thus, also, in Tewa: "*kc'c,*" 'aunt!'—response: "'*ɥ'ɥ kc'c'ɛ́,*" 'you nephew or niece!' But Tewa *kc'c'ɛ* signifies nephew or niece of an aunt irrespective of age or condition. This same *'ɛ* is also the common diminutive-forming postjunct of the language, and can as such be added to relationship terms which already end in *'ɛ*. Thus *kc'c'ɛ'ɛ*, 'little nephew or niece of an aunt' (*kc'c'ɛ*, nephew or niece of an aunt; *'ɛ*, diminutive). For the sake of brevity, *'ɛ* has been called the diminutive in giving etymologies in this paper. Some of the terms that indicate relationship through marriage may also add *'ɛ* with this same peculiar force. The meaning of *mæ'ɸmæ'ɛ* seems to be irregular. (See below.)

Separate terms are used to express relationship through marriage, with the exception of *tara*, *tara'ɛ*, *jija*, *jija'ɛ*, *tɥ'ɥnɥ*, *tɥ'ɛ*, *kc'c*, *kc'c'ɛ*, *mæ'ɸmæ'ɛ*. The words meaning 'man' and 'woman' may also be used to signify 'husband' and 'wife,' just as in many other languages, although special terms with the latter meaning are also in use. Thus one may express 'my husband' in six ways:

nabi t'cwà,
nabi sɕŋ,
nabi sɕŋ,
nabi sɕndc,
nabi tara,
nabi tara'ɛ,

and 'my wife' in the following five:

nabi t'cwà,
nabi kwi,
nabi kwijc,
nabi jija,
nabi jija'ɛ.

The Tewa live compactly in villages, and probably a larger number of individuals see one another daily than is the case with most non-Pueblo Indians. Moreover, the names of the dead are freely mentioned by the Tewa and the relationships of the dead are freely

discussed. Nevertheless, remote relationships do not appear to be remembered or kept account of as well as among such tribes as the Ute or the Yuma. It may be, of course, that in modern times the Tewa have become careless in this respect.

The free everyday use of relationship terms between individuals who are not actually related as the terms indicate is encountered everywhere in the Southwest. The custom is explained as a spontaneous expression of a deep feeling of friendship or kinship that runs through the thought of the Indians. Especially when misfortune or sorrow are present relationship terms are freely indulged in. Among the Yumans of the lower Colorado river valley one hears this custom carried to the extreme on the occasion of a cremation. While standing about the burning pyre, individuals who have no known relationship to each other embrace, or one lays hands on the other, and one hears amid their sobs, "Oh, my younger brother," "Oh, my elder brother," or any other terms which seem appropriate.

A number of the Tewa terms have peculiar usages aside from their primary usage, being employed in addressing certain officers, divinities, and the like. Some of the terms have what seem to the English speaker to be several meanings. Thus: *t'cwà* signifies 'person,' 'people,' 'human being as distinct from other animals,' 'husband,' 'wife,' 'tribe,' 'clan,' 'phratry,' 'Indian as distinct from other peoples.' To the Tewa mind *t'cwà* seems to be the label of a single conception.

The Tewa practise monogamy, marriage being celebrated or solemnized by a native and also by a Christian ceremony. Unmarried girls are frequently used by young men and sometimes by older men, although there is now not so much of this "immorality" as formerly. It used to be common for a girl's first babe to be born before marriage. There is a woman now living at San Ildefonso who has given birth to three children without being married. The courtships are usually very shy. The man must obtain permission from the girl's parents before wedding her. It is well known by the villagers that certain women have lewd tendencies. Women who have illicit intercourse with Mexicans or Americans are looked

down upon by other members of the tribe. But there is no prejudice at all against a Tewa girl or woman marrying a Mexican or American in the regular way. Mr Thomas S. Dozier, an American of Española, has been married to a Santa Clara woman for years, and she has borne him eight children. The Indians appear to be quite proud of this union. Mr Eulogio Cata, an Indian of San Juan, has a Mexican wife, and it is the opinion of the Indians of San Juan that he has married well. The people usually keep quite straight in sexual matters and are mostly free from genital diseases. At present the men live with their wives and children and are uncertain whether Tewa men in ancient times slept in the kivas or with their wives and children as at the present time.

The clans at the Tewa villages are fairly numerous. A tentative list of Tewa clans is given by Mr F. W. Hodge in his article on Pueblo Indian Clans.[1] Each clan occupies a certain locality in the pueblo. Tewa children belong to the clan of the father. The clans of each village are united in two groups or phratries—the *tɛnuri'ɨɳt'cwà*, 'winter people', and the *pajcgɛri'ɨɳt'cwà*, 'summer people.' A clan, wherever it occurs, always belongs to the same phratry. The "winter people" are also called *k'uñæ t'owà*, 'turquois people'; the "summer people" are also called *pot'owà*, 'squash people'. A turquois clan, if it occurs, belongs to the winter people, a squash clan to the summer people.

The government is in the hands of many officers, all of whom have religious as well as governmental functions. Matters pertaining to social organization and government are as difficult to investigate as are the religious ideas and practices of the Tewa. Miss B. W. Freire-Marreco furnished the writer with the following account of naming, for which she in turn is indebted to Miss Clara True, of the Española valley. Four days after birth the naming ceremony takes place. Before sunrise a female relative of the mother comes to the house where the mother and infant are to be found. The father holds the child up, standing in the doorway. The female relative has previously placed sacred water in one side of a two-bowled vessel of peculiar shape and sacred meal in the other side.

[1] *American Anthropologist*, vol. IX, no. 4, Oct. 1896, pp. 345–352.

She now sprinkles the water and meal by means of her hand from the vessel in the direction of the rising sun while the father holds the child aloft, and she gives the child not more than four names appropriate to the season. She may give only one name, but most children receive two or three. After this ceremony the mother is supposed to go to bed for four days more. She is really up and about most of the time. About the eighth day the child is taken to be baptized in the Catholic church. Certain names are appropriate to children born in certain months. The female relative who sprinkles the meal and water knows names suitable to the season. She is chosen by the child's mother. It is not clear whether she must be a real relative. Some of the details given above relative to naming agree with fragmentary information obtained by the writer. Most adults have only one Indian name, which is always a compound word made by putting together two simple words so that the whole has a meaning. In many instances nicknames are applied, or only a part of the full compound name is in use. As typical men's names of San Ildefonso we might name in translation: Quivering Stars, White Cloud, Medicine Mountain, Daylight Mountain, Sun Bird, Cloud Stick, Cloud Painting, Rockpine Bird, Falling Flower, Macaw Bird, Eagle Tail, Bluebird Tail, Mountain Lion Mountain, Sun Painting, Cottonwood Yellowness Quivering (referring to a species of yellow bird seen jumping in the cottonwoods), White Lake, Mountain Wood, Little Mountain, Willow Bird. Some of the women's names are in translation: Leaf Bird (referring to an actual species of bird), White Flower, Waco Flower, Opuntia Flower, Mountain Water, Sun Leaf, Flower Leaf (that is, "petal"), Mountain-Lion Stalk (that is, "fern"), Squash Flower, Abalone Zigzag, Flower Frost, Yellow Flower, Yellow Leaf, Rose Flower, Flower Zigzag, Aspen Flower, Spruce Zigzag, Blue Turquois, Lake Frost, All-colored Flower, Yucca Baccata Flower. Each Indian has also a Spanish name, the given part of which is received at the baptism. The Tewa know the Spanish names of most of the adult Tewa of the same village, although when talking among themselves only the popular forms of the Tewa names are used. At a non-progressive pueblo, such as the

Keres village of Santo Domingo, the Spanish names of Indians are surprisingly little known and used.

The Tewa relationship terms will be presented below under four heads: consanguinity, relationship through marri[illegible], sex and age, and miscellaneous. In the case of consanguinity and relationship through marriage the items are headed by Indian words; for miscellaneous, English terms serve to introduce the various items.

Immediately following each relationship term listed below under consanguinity and relationship through marriage will be found indicated in parentheses whether the term may be applied by male only, by female only, or by both male and female. (m.) stands for male, (f.) for female, (m. f.) for male or female.

The 2+ plural of the relationship terms given below is the same as the singular with the following exceptions: *'ɛ*, 'son,' 'daughter,' when not compounded can have either *'ɛ* or *'ɛñɸ* in the 2+ plural; terms ending in *'i'ⁱ* change this *'i'ⁱ* to *'iŋ* in the 2+ plural.

Each of the relationship terms has been tested and investigated by applying it to a considerable number of actual relationships, using Indians' names. Only the results of this work are here presented; the details are omitted.

We have in Tewa: (*a*) terms applied by persons of one sex only to persons of either sex, e. g., *kc'c'ɛ*; (*b*) terms applied by persons of either sex to persons of one sex only, e. g., *mɸ'ɸmɸ*; (*c*) terms applied by persons of one sex only to persons of one sex only, e. g., *sʂŋ*; (*d*) terms applied by persons of either sex to persons of either sex, e. g., *pa'ᵉrɛ*.

The diagrams illustrate the system of nomenclature for consanguineous relationship only. Each diagram represents two collateral lines for four generations. They are self-explanatory. All the possible blood-relationships for which there is a special expression in Tewa are indicated in the diagrams.

The symbols used in writing Tewa and other Indian words in this paper have the following values. The italicized letter or letters of the word in parentheses accompanying each symbol indicates approximately the pronunciation.

(1) Orinasal vowels: *ą* (Eng. *f*ather, nasalized), *æ̨* (Eng. m*a*n, nasalized), *ɛ̨* (mod. Greek ε, nasalized), *i̧* (Eng. rout*i*ne, nasalized), *ą̂* (French p*a*s, nasalized), *ɔ̨* (mod. Greek ω, nasalized), *u̧* (Eng. r*u*le, nasalized).

(2) Oral vowels: *a* (Eng. *f*ather), *ɛ* (mod. Greek ε), *i* (Eng. rout*i*ne), *ɔ* (mod. Greek ω), *u* (Eng. r*u*le).

(3) Semivowels: *j* (Ger. *j*a), *w* (Eng. *w*ar).

(4) Larynx consonants: ' (glottal stop), *h* (Eng. *h*ow).

(5) Dorsal consonants: *k* (Vienna German *g*ehen), *kw* (Vienna German *g*ehen, labialized), *k'* (glottalized k), *k‘* (aspirated k), *ŋg* (Eng. fi*ng*er), *g* (Spanish abogado), *qw* (Scotch English *wh*at), *ŋ* (Eng. si*ng*), *ŋw* (Eng. La*ngw*orthy).

(6) Frontal palatalized consonants: *ñ* (Sp. ma*ñ*ana).

(7) Frontal consonants: *t* (Vienna German *d*u), *t'* (glottalized t), *t‘* (aspirated t), *nd* (Eng. ba*nd*anna), *r* (Eng. *r*un), *ts* (German z, but not aspirated), *ts'* (glottalized ts), *s* (Eng. *s*ee), *tʃ* (Eng. *ch*ew, but not aspirated), *tʃ'* (Eng. *ch*ew glottalized), *ʃ* (Eng. *sh*ip), *n* (Eng. *n*ow).

(8) Lip consonants: *p* (Vienna German *b*aff), *p'* (glottalized p), *p‘* (aspirated p), *mb* (Eng. Ju*mb*o), *b* (Sp. a*b*ogado), *m* (Eng. *m*an).

Superior vowels indicate very short vowel sounds following a glottal stop. In such sounds the voice is apt to be grating or *knarrstimmig*. Syllables over the vowel of which the grave accent is written do not have as loud stress accent as other syllables.

Consanguinity

Self

nąˀ (m. f.). I, myself.

Direct Line

tara (m. f.). (1) 'Father.' As exclamation: *tara*, 'father!' The Mexican loanword *tatà* is also in common use, meaning 'father.' (2) Figuratively. Thus: *nąˀi̧mbi tara jcsì*, our Father, God (*nąˀ*, I; *i̧ŋ*, 2+ plu. animal gender; *bi*, possessive; *tara*, father; *jcsì*, God, < Sp. *Dios*, *Dioses*. (3) Applied by a wife to her husband, who often calls him *tara*, 'father,' as the children of the family do. (4) Applied to the Winter cacique. The Summer

cacique is called *jija*, 'mother.' (5) Compounded in *tarasẹndc*, 'aged sire' (*tara*, father; *sẹndc*, old man), a term used in addressing old men for whom great respect is shown, especially in addressing the Winter cacique. Sometimes abbreviated to *tasẹndc*. (6) Compounded as in *tarapi-*, 'fatherless,' 'orphan' (*tara*, father; *pi*, negative).

tara'ɛ (m. f.) (*tara*, father; *'ɛ*, diminutive). Familiar diminutive form of *tara*, 'father.' Used same as *tara* with meanings (1), (2), and (3).

tatà (m. f.) (< Sp. *tata*, father, papa). (1) 'Father', 'papa', 'dad', in almost any sense in which *tara*, 'father,' is used, even in sacred language as *tatà jcsì*, 'Father God' (*tatà*, father, < Sp. *tata*; *jcsì*, God, < Sp. *Dios*, *Dioses*). (2) Applied loosely to father, elder brother, father's brother, or other relatives older than self. According to Miss B. W. Freire-Marreco a child at Santa Clara applied *tatà* to its mother's brother, but this was considered to be a child's mistake.

Terms used in addressing respected old persons. Old men for whom respect or reverence is shown should be accosted as *tarasẹndc* (*tara*, father; *sẹndc*, old man), often abbreviated to *tasẹndc*; for old women for whom like respect or reverence is shown *jijakwijc* (*jija*, mother; *kwijc*, old woman), often abbreviated to *jakwijc*, is used. Since the Winter cacique is called *tara*, 'father,' he should be addressed as *ta(ra)sẹndc*, while the Summer cacique, who is the *jija*, 'mother,' of the Indians, is spoken to as *j(ij)akwijc*. In working and walking about with the old Winter cacique of Nambé the writer noticed that he was always addressed by the Nambé Indians as *ta(ra)sẹndc*.

It is barely possible that *tatà* is of Tewa as well as of Spanish origin. The Tewa do not recognize the Spanish origin of the word.

tatà'ɛ (m. f.) (*tatà*, father, < Sp. *tata*; *'ɛ*, diminutive). Familiar diminutive form of *tatà*, 'father.' Used the same as *tatà* with meanings (1) and (2).

jija (m. f.) (cf. Keres *jája*, mother). (1) 'Mother.' As exclamation: *jija*, 'mother!' (2) Figuratively. Thus: *nâ'ịmbi jija*,

'our mother,' said of a certain nameless divinity (*nq̂*, I; *'įŋ*, 2+ plu. animal gender; *ƀi*, possessive; *jija*, mother). (3) Applied by a husband to his wife, who often calls her *jija*, 'mother', as the children of the family do. (4) Applied to the Summer cacique. The Winter cacique is called *tara*, 'father.' (5) Compounded in *jijakwijc*, 'aged dame' (*jija*, mother; *kwijc*, old woman), a term used in addressing old women for whom great respect is shown; also in addressing the Summer cacique. Sometimes abbreviated to *jakwijc*. (6) Compounded as in *jijapi-*, 'motherless,' 'orphan' (*jija*, mother; *pi*, negative); *papajija*, 'great grandmother' (*papa*, great grandfather; *jija*, mother).

jija'ɛ (m. f.) (*jija*, mother; *'ɛ*, diminutive). Familiar diminutive form of *jija*, 'mother.' Used same as *jija* with meanings (1), (2), and (3).

'ɛ (m. f.). (The singular has falling intonation. For the 2+ plu. two forms are in use: (a) *'ɛ*, same as sing. but with rising-falling intonation; (b) *'ɛñx̣*.) (1) 'son', 'daughter'. (2) In the expression *sẹndcƀi 'ɛ kwijcƀi 'ɛ*, 'children of the old man and the old woman,' that is, of the Winter cacique and the Summer cacique, 'the Indians of the pueblo.' (3) Familiarly and loosely: 'child,' 'dear.' Thus: *mƀihuña*, *naƀi 'ɛ*, 'eat, girls!' (*mƀi*, you 2 +; *huña*, to eat; *naƀi*, my; *'ɛ*, son, daughter). (4) 'girl sweetheart.' Thus in a song: *'agcjc pcƀ̀*, *naƀi 'ɛ*, *wimbc'ᵉ winda'ᵉ*, 'Star Flower, thee only do I love' (*'agcjc*, star; *pcƀ̀*, flower, *naƀi*, my; *'ɛ*, son, daughter; *wimbc'ᵉ*, alone; *wi*, I you 1; *nda'ᵉ*, to want, to love). (5) Postjoined to any noun in the language as diminutive particle. When thus used the 2+ plural is never *'ɛñx̣*. Thus: *k'u*, 'stone'; *k'u'ɛ*, 'little stone.'

t'ɛtɛ (m. f.). (1) 'Grandfather,' that is, father's father or mother's father. (2) Applied to the *tsaƀijc*, Sp. "*abuelo.*" An Indian personified as this divinity goes about on certain occasions whipping the children of the village. He is always called *t'ɛtɛ*, 'grandfather.' (3) Compounded as in *papat'ɛtɛ*, 'great grandfather' (*papa*, great grandfather; *t'ɛtɛ*, grandfather).

t'ɛtɛ'ɛ (m.) (*t'ɛtɛ*, grandfather; *'ɛ*, diminutive). 'Grandson', 'granddaughter', that is, son's son, son's daughter, daughter's son, daughter's daughter.

sa'ᵉja (m. f.). (1) 'Grandmother', that is, father's mother, mother's mother). (2) Compounded as in *papasa'ᵉja*, 'great grandmother' (*papa*, great grandfather; *sa'ᵉja*, grandmother).

sa'ᵉja'ɛ (f.) (*sa'ᵉja*, grandmother; *'ɛ*, diminutive). 'Grandson', 'granddaughter', that is, son's son, son's daughter, daughter's son, daughter's daughter.

papa (m. f.). (1) 'Great grandfather', that is, father's father's father, father's mother's father, mother's father's father, mother's mother's father. Also commonly used in expressions such as *t'ɛlɛbi papa*, 'grandfather's great grandfather', 'male ancestor'. (2) Compounded as in *papat'ɛlɛ*, 'great grandfather' (*papa*, great grandfather; *t'ɛlɛ*, grandfather), etc. The form *papa* appears in all non-analytic expressions denoting the third generation removed.

papa'ɛ (m.) (*papa*, great grandfather; *'ɛ*, diminutive). 'Great grandson', 'great granddaughter', that is, son's son's son, son's son's daughter, son's daughter's son, son's daughter's daughter, daughter's son's son, daughter's son's daughter, daughter's daughter's son, daughter's daughter's daughter.

papat'ɛlɛ (m. f.) (*papa*, great grandfather; *t'ɛlɛ*, grandfather). 'Great grandfather', that is, father's father's father, father's mother's father, mother's father's father, mother's mother's father. Perhaps commoner than mere *papa*, which has the same meaning.

papat'ɛlɛ'ɛ (m.) (*papat'ɛlɛ*, great grandfather; *'ɛ*, diminutive). 'Great grandson,' 'great granddaughter,' that is, son's son's son, son's son's daughter, son's daughter's son, son's daughter's daughter, daughter's son's son, daughter's son's daughter, daughter's daughter's son, daughter's daughter's daughter.

papasa'ᵉja (m. f.) (*papa*, great grandfather; *sa'ᵉja*, grandmother). 'Great grandmother,' that is, father's father's mother, father's mother's mother, mother's father's mother, mother's mother's mother.

papasa'ᵉja'ɛ (f.) (*papasa'ᵉja*, great grandmother; *'ɛ*, diminutive). 'Great grandson', 'great granddaughter', that is, son's son's son, son's son's daughter, son's daughter's son, son's daughter's

daughter, daughter's son's son, daughter's son's daughter, daughter's daughter's son, daughter's daughter's daughter.

papajija (m. f.) (*papa*, great grandfather; *jija*, mother). 'Great grandmother,' that is, father's father's mother, father's mother's mother, mother's father's mother, mother's mother's mother. Equivalent to *papasa'ᵃja*. A corresponding masculine form, *papatara* (*papa*, great grandfather; *tara*, father) is not used.

papajija'ɛ (f.) (*papajija*, great grandmother; *'ɛ*, diminutive). 'Great grandson,' 'great granddaughter,' that is son's son's son, son's son's daughter, son's daughter's son, son's daughter's daughter, daughter's son's son, daughter's son's daughter, daughter's daughter's son, daughter's daughter's daughter.

Collateral Lines

pa'ᵃrɛ (m. f.). (1) 'Elder brother', 'elder sister', 'brother or sister older than self'. The Tewa render *pa'ᵃrɛ* in Spanish by *hermano* or *hermana*, according to the natural gender. The other Tanoan languages formally distinguish sex in the designations of elder brother or elder sister. Thus: Isleta *'ɨmpapeɨ*, 'my elder brother'; *'ɨntuteɨ*, 'my elder sister'; Taos *'ąnpapanȧ*, 'my elder brother'; *'ąntctunȧ*, 'my elder sister'; Jemez *nɨ'upapc̈'ɛ*, 'my elder brother'; *nɨ'ukck'a'ɛ*, 'my elder sister'. Tewa stands alone in not formally distinguishing sex in this relationship term; it will be noticed that the words in the other Tanoan languages meaning 'elder brother' seem to contain the same root as Tewa *pa'ᵃrɛ*. As an adjective *pa'ᵃrɛ-* means 'first.' Thus: *k'u pa'ᵃrɛ'i'ⁱ*, 'the first stone' in a row. If one has several *Geschwister* elder than self they may be distinguished thus: *pa'ᵃrɛ pa'ᵃrɛ'i'ⁱ*, 'eldest brother' (*pa'ᵃrɛ*, elder brother or sister; *pa'ᵃrɛ*, first; *i'ⁱ*, postfix denoting sing., animal gender); *pa'ᵃrɛ pa'ᵃrɛ'iri'i'ⁱ*, 'elder brother or sister next in age to eldest brother or sister' (*pa'ᵃrɛ*, elder brother or sister; *pa'ᵃrɛ*, first; *'iri*, next following; *'i'ⁱ*, postfix denoting sing., animal gender); *pa'ᵃrɛ (pa'ᵃrɛ)pcwɨŋgɛ'iri'i'ⁱ*, 'elder brother or sister second in age to eldest brother or sister' (*pa'ᵃrɛ*, elder brother or sister; *pa'ᵃrɛ*, first; *pcwɨŋgɛ*, in the third place; *'iri*, next following; *'i'ⁱ*, post-

fix denoting sing., animal gender). If it is desired to show the sex of a *pa'ᵃrɛ*, one adds one of the sex-age nouns. Thus: *nabi pa'ᵃrɛ'a' ᵃñu*, 'my elder sister who is a young unmarried woman'

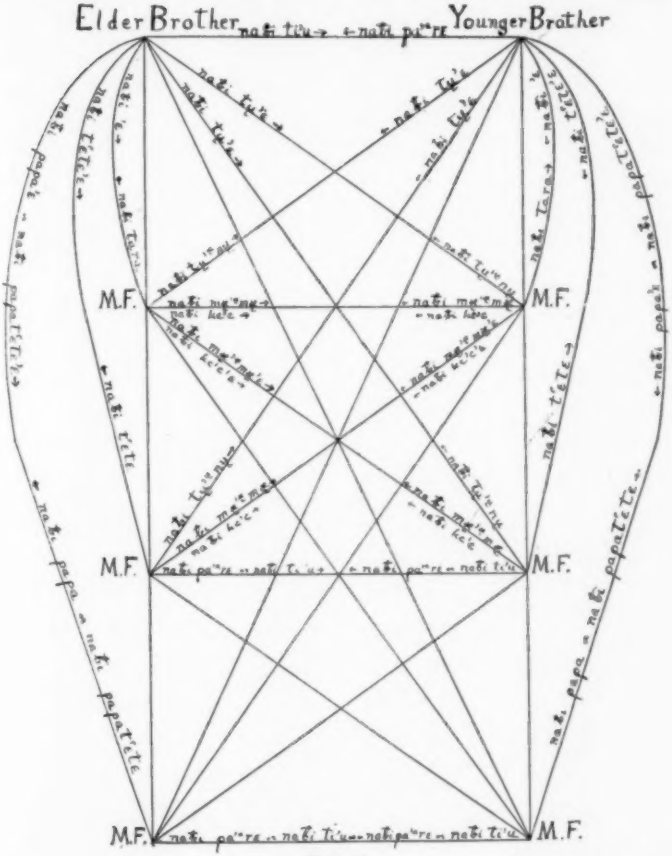


FIG. 55

(*nabi*, my; *pa'ᵃrɛ*, elder brother or elder sister; *'a'ᵃñu*, young unmarried woman, virgin). (2) Loosely applied to second, third, or fourth cousin or other relative or person older than

self. (3) The senior officer or officers of each governmental body. Miss Barbara Freire-Marreco informs the writer that the "*capitan mayor*" is *pa'ᵃrɛ* to the other "*capitanes*," the "*fiscal*

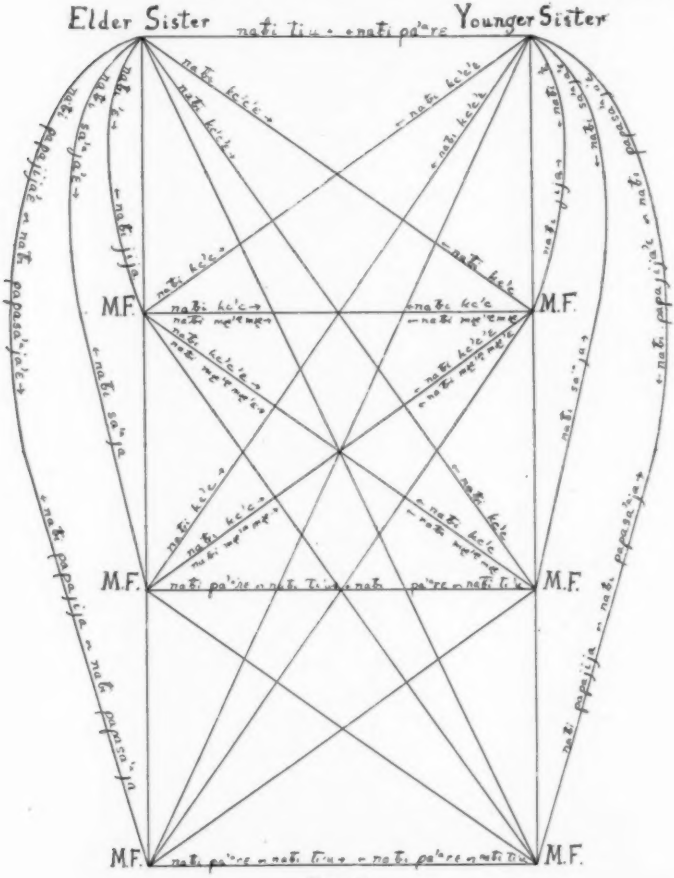


FIG. 56

mayor" *pa'ᵃrɛ* to the other "*fiscales*"; the Summer cacique is *pa'ᵃrɛ* to Elisio Paladura and José Guadalupe at Santa Clara.

(4) Applied to a "*principale*," that is, (a) a man who has been governor of a pueblo; (b) any pueblo officer as distinguished from non-officers. (5) Used to denote official relation of

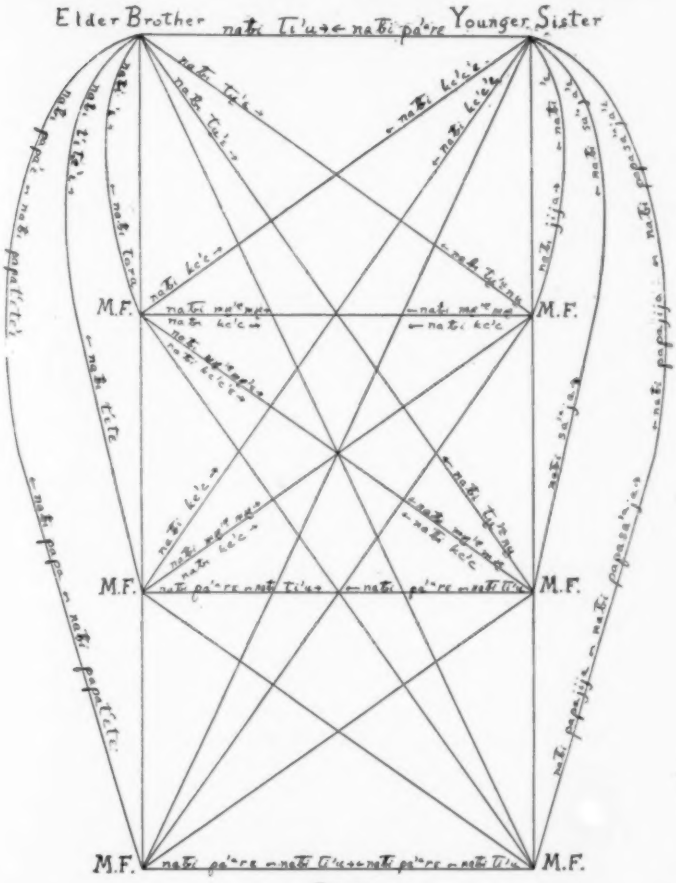


FIG. 57

superior to inferior or adviser to advised. Thus, according to Miss Freire-Marreco, *pa'ᵉre* is used at Santa Clara to

express the official relation of Chief Special Officer W. E. Johnson to his assistant, Miss Clara True. (6) Applied to a Catholic monk or nun. This usage is based on Sp. *los Hermanos*, 'the

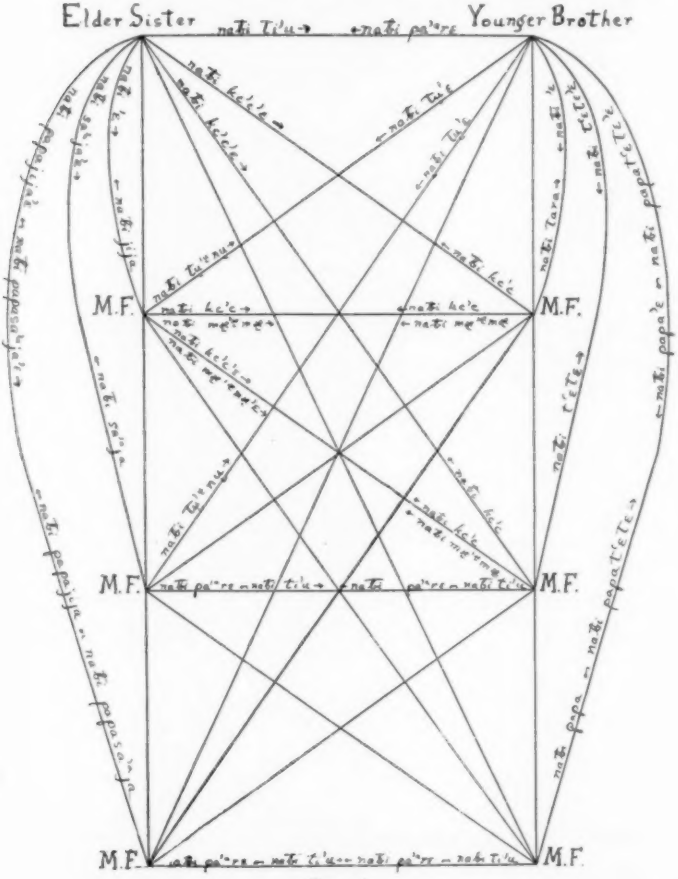


FIG. 58

Brothers'; *las Hermanas*, 'the Sisters'. (7) Compounded as in *ti'upa'ᵒrɛ*, 'younger persons and elders' (*ti'u*, younger brother

or sister; *pa'ᵃrɛ*, elder brother or sister). This term is said to be used especially in council.

ti'u (m. f.). (1) 'Younger brother,' 'younger sister,' 'brother or sister younger than self.' The Tewa render *ti'u* in Spanish by *hermanito* or *hermanita*, according to the natural gender. The other Tanoan languages formally distinguish sex in the designations of younger brother or younger sister. Thus: Isleta *'įmp'ai'uɛį*, 'my younger brother'; *'įmp'atuɛį*, 'my younger sister'; Taos *'ąnp'ainà*, 'my younger brother'; *'ąnp'aju'unà*, 'my younger sister'; Jemez *nį'upɛtu'ɛ*, 'my younger brother'; *nį'up'a'ɛ*, 'my younger sister'. Tewa stands alone, as in the case of *pa'ᵃrɛ*, in not formally distinguishing sex in this relationship term. It will be noticed that the Isleta term meaning younger sister and the Jemez term meaning younger brother may contain a syllable akin to Tewa *ti'u*. As in the case of *pa'ᵃrɛ*, the sex of the *ti'u* may be indicated by adding one of the age-sex nouns. (2) Loosely applied to second, third, or fourth cousin or other relative or person younger than self. (3) Applied to a novice, a person newly initiated. (4) Compounded as in the expression *ti'upa'ᵃrɛ*, 'younger persons and elders'. See above under *pa'ᵃrɛ*.

tɻ'ᶣnɻ (m. f.). (1) 'Uncle,' that is, father's elder brother, father's younger brother, mother's elder brother, mother's younger brother. Miss Freire-Marreco says that *tatà* is also heard designating this relationship. (2) 'Great uncle,' that is, grandfather's or grandmother's elder or younger brother. This relationship is also expressed by a descriptive term such as *t'ɛɬɛƀi ti'u* 'grandfather's younger brother (or sister)' (*t'ɛɬɛ*, grandfather; *ƀi*, possessive; *ti'u*, younger brother or sister). (3) Also used loosely, and of certain relationships through marriage. For the latter, see below.

tɻ'ɛ (m.) (*tɻ*, in this compound equivalent to *tɻ'ᶣnɻ*; *'ɛ*, diminutive). (1) 'Nephew,' 'niece,' that is, elder or younger brother's or sister's son or daughter. (2) 'Great nephew,' 'great niece,' that is, elder or younger brother's or sister's son's or daughter's son or daughter. (3) Also used loosely, and of certain relationships through marriage. For the latter, see below.

kc'c (m. f.). (1) 'Aunt,' that is, father's elder sister, father's younger sister, mother's elder sister, mother's younger sister. (2) 'Great aunt,' that is, grandfather's or grandmother's elder or younger sister. This relationship is perhaps more frequently expressed by a descriptive term. (3) Female first cousin (German *Base* or *Cousine*). (4) Aunt second removed. (5) Also used loosely, and of certain relationships through marriage. For the latter, see below.

kc'c'ɛ (f.) (*kc'c*, aunt; *'ɛ*, diminutive). (1) 'Nephew,' 'niece,' that is, elder or younger brother's or sister's son or daughter. (2) 'Great nephew,' 'great niece,' that is, elder or younger brother's or sister's son's or daughter's son or daughter. (3) Female cousin second removed. (4) Also used loosely, and of certain relationships through marriage. For the latter, see below.

mx̣'x̣mx̣ (m. f.). (1) 'Male first cousin' (German *Vetter* or *Cousin*). According to Miss Freire-Marreco *tatà* is also used for this relationship. (2) 'Uncle second removed.' (3) Also used loosely, and of certain relationships through marriage. For the latter, see below.

mx̣'x̣mx̣'ɛ (m. f.) (*mx̣'x̣mx̣*, male first cousin; *'ɛ*, diminutive). (1) 'Male cousin second removed.' (2) Also used loosely, and of certain relationships through marriage. For the latter, see below.

Relationship through Marriage

Descriptive terms denoting relationship through marriage are even commoner than those denoting consanguineous relationship. Thus one may say *naɓi sçmbi tara*, 'my father-in-law' (*naɓi*, my; *sçɳ*, husband; *ɓi*, possessive; *tara*, father), instead of *naɓi jasẹndc*, 'my father-in-law', etc.

t'cwà (m. f.). 'Husband,' 'wife.' The word has also several other meanings. See elsewhere in this paper.

sçɳ (f.). 'Husband.' This is said to be an old word, very little used at present.

sẹɳ (f.). 'Man in prime,' 'husband.' See also under sex-age nouns.

sẹndc (f.). 'Old man,' 'husband.' See also under sex-age nouns. Cf. Sp. *mi viejo*.

tara (f.). 'Father,' 'husband.' Often used just as wives call their husbands "father" in English, German, and Spanish.

tara'ɛ (f.) (*tara*, father, husband; *'ɛ*, diminutive). Familiar diminutive of *tara*, 'father'. 'Father', 'husband'. Cf. *tara*, above.

kwi (m.). 'Woman in prime,' 'wife.' See also under sex-age nouns.

kwijc (m.). 'Old woman,' 'wife.' See also under sex-age nouns. Cf. Sp. *mi vieja*.

jija (m.). 'Mother,' 'wife.' Often used just as husbands call their wives "mother" in English and German.

jija'ɛ (m.). (*jija*, mother, wife; *'ɛ*, diminutive). Familiar diminutive of *jija*, 'mother.' 'Mother,' 'wife.' Cf. *jija*, above.

sa'i'ɨ (m.). 'Bride' already married or about to be married.

jasɛ̨ndc (m. f.) (*ja*, as also in *jakwijc*, see below; *sɛ̨ndc*, old man). 'Father-in-law,' that is, husband's father, wife's father.

jakwijc (m. f.) (*ja*, as also in *jasɛ̨ndc*, see above; *kwijc*, old woman). 'Mother-in-law,' that is, husband's mother, wife's mother.

sɛ̨ñį̨ŋgi (m. f.). (1) 'Son-in-law' that is, daughter's husband. (2) Applied to son's daughter's husband or to daughter's daughter's husband. (3) Loosely applied to son-in-law of relative or other person. Thus at Santa Clara L. T. calls S. N.'s son-in-law *sɛ̨ñį̨ŋgi*, just as S. N. himself does. L. T. is S. N.'s uncle once removed.

sa'ɛ (m. f.) (*sa*, ? ; *'ɛ*, diminutive?). (1) 'Daughter-in-law', that is, son's wife. (2) Applied to son's son's wife or daughter's son's wife. (3) Loosely applied to daughter-in-law of relative or friend.

ja'a (m. f.). 'Any consanguineous relative of husband or wife.' Used mostly to denote distant or vague relationships of this sort. For greater definiteness descriptive terms are used instead of *ja'a*. When *ja'a* is applied by a wife to her husband's relatives, it is equivalent to *matc'i'ɨ*.

matc'i'ɨ (f.). 'Any consanguineous relative of husband.' Used mostly to denote distant or vague relationships of this sort. For greater definiteness descriptive terms are used. The term *ja'a*, see above, may be substituted for *matc'i'ɨ* in every instance.

tɥ'ᵸnɥ (m. f.). 'Husband of *kc'c*,' which means 'aunt', etc. See above. The primary meaning of *tɥ'ᵸnɥ* is 'consanguineous uncle'. See above. But when *kc'c* means female cousin *mæ'ᶠmæ* must be used instead of *tɥ'ᵸnɥ*. See below.

tɥ'ɛ (m.) (for etymology see above). 'Husband of *kc'c'ɛ*,' which means 'niece', etc. See above. The primary meaning of *tɥ'ɛ* is 'consanguineous nephew or niece.' See above. But when *kc'c'ɛ* means female cousin twice removed, *mæ'ᶠmæ'ɛ* must be used instead of *tɥ'ɛ*. See below.

kc'c (m. f.). 'Wife of *tu'ᵸnɥ*,' which means 'uncle,' etc. See above. The primary meaning of *kc'c* is 'consanguineous aunt,' etc. See above.

kc'c'ɛ (f.) (for etymology see above). 'Wife of *tɥ'ɛ*', which means 'nephew,' etc. See above. The primary meaning of *kc'c'ɛ* is 'consanguineous nephew or niece.' See above.

mæ'ᶠmæ (m. f.). 'Husband of *kc'c* when the latter word means consanguineous female cousin.' For the husband of *kc'c* in other meanings *tɥ'ᵸ'nɥ* and not *mæ'ᶠmæ* is used. The primary meaning of *mæ'ᶠmæ* is 'consanguineous male first cousin.' See above.

mæ'ᶠmæ'ɛ (m. f.). 'Husband of *kc'c'ɛ*' when the latter word means 'consanguineous female cousin twice removed'. For the husband of *kc'c'ɛ* in other meanings *tɥ'ɛ* and not *mæ'ᶠmæ'ɛ* is used. The primary meaning of *mæ'ᶠmæ'ɛ* is 'consanguineous male cousin twice removed'. See above.

Step-relationship. Step-relationship is indicated by prejoining *kwa* to any one of the relationship terms. Thus: *kwatara*, 'step father' (*kwa*, step-; *tara*, father). *nabi kwasa'ᵊja*, 'my step-grandmother', has both meanings of English step-grandmother: my grandfather's wife not my mother or my real or step-father's or mother's step-mother. As in the case of English *step-*, *kwa-* is often omitted. The only irregularity which the usage of *kwa*-compounds presents is that no such form as *kwa'ɛ* exists. Stepson or stepdaughter is called by the father *kwatara'ɛ* (*kwa*, step-; *tara*, father; *'ɛ*, diminutive), by the mother *kwajija'ɛ* (*kwa*, step-; *jija*, mother; *'ɛ*, diminutive).

Thus without *kwa* prejoined *tara'ɛ* and *jija'ɛ* mean merely father and mother; with *kwa* prejoined they mean stepson or stepdaughter of father and stepson or stepdaughter of mother.

Bachelor, old-maid. 'Unmarried person,' whether young or old, can be expressed only by descriptive terms. Thus: *winq̂kwi-mɻpi*, 'he has no wife' (*wi*, negative; *nq̂*, he-her; *kwi*, woman in prime, wife; *mɻ*, to have; *pi*, negative); *winq̂sɛŋmɻpi*, 'she has no husband' (*wi*, negative; *nq̂*, she-him; *sɛŋ*, man in prime, husband; *mɻ*, to have; *pi*, negative). Such expressions are also applied to celibates, such as Catholic priests, monks, and nuns.

Widower, widow. Such expressions as the following might be used: *'ibi kwi' ɻŋtʃu*, 'his wife is dead' (*'i*, he; *bi*, possessive; *kwi*, woman in prime, wife; *'ɻŋ*, she with reference to him; *tʃu*, to be dead); *'ibi sɛŋ 'ɻŋtʃu*, 'her husband is dead' (*'i*, she; *bi*, possessive; *sɛŋ*, man in prime, husband; *'ɻŋ*, he with reference to her; *tʃu*, to be dead).

Sex and Age

The following terms denote combinations of sex and age.

'ɛ (2 + plu. *'ɛ* or *'ɛñq̂*). This word means 'baby', 'infant', 'child' as well as 'son,' 'daughter,' 'girl sweetheart' given above.

'ɛ'ɛnukɛ (2 + plu. *'ɛ'ɛnɻŋ'ɛñq̂*), 'young boy.'

'a'ᵃñukɛ (2 + plu. *'a'ᵃñɻŋ'ɛñq̂*), 'young girl.'

'ɛ'ɛnu (2 + plu. *'ɛ'ɛnuŋ*), 'boy at adolescence.' Sometimes also used of a boy who has not yet had intercourse.

'a'ᵃñu (2 + plu. *'a'ᵃñɻŋ*), 'girl at adolescence.' Sometimes also used of a girl who has not yet had intercourse.

sɛŋ (2 + plu. *sɛŋnq̂'Ɛŋ*), 'man in prime'.

kwi (2 + plu. *kwiñq̂'Ɛŋ*), 'woman in prime'.

sɛndc (2 + plu. *sɛnda*), 'old man.' Also used very much in addressing or speaking of old people for whom respect is shown, especially an aged head of a family or master of a house. It would not be applied to a man under forty or forty-five years of age, although the Tewa age quickly. Note also special usages mentioned elsewhere.

kwijc (2 + plu. *kwijc* with rising-falling intonation of last syllable; the singular has falling intonation of last syllable). The word is used much as is *sẹndc* to show respect for aged women. Note also special usages mentioned elsewhere.

Miscellaneous

Relationship terms figuratively used. Relationship terms are applied very freely to persons who do not bear the relationship the terms indicate. Children are taught to apply the proper words to non-relatives as well as relatives as soon as they can talk. By a certain child one of the parents' more elderly male friends was called *tara*, 'father'. A younger male friend of the family but older than the child itself was called *pa'ᵊrɛ*, 'elder brother'. The wife of the friend called *tara* was termed *sa'ᵊja*, 'grandmother', and not *jija*, 'mother', although the latter term corresponds to *tara*, 'father'. Miss Freire-Marreco reports that when living at Santa Clara village she was called *sa'ᵊja*, 'grandmother', by the younger generation, while by the older people she was called *kc'c*, 'aunt', 'female cousin'. One entire family of intimate friends called her *sa'ᵊja*. Perhaps the idea in doing so was that *sa'ᵊja* implies a closer relationship than *kc'c*.

Relationship terms are frequently used before or after Indian names, especially nicknames. Thus: *sa'ᵊja scɔ̃c*, 'Grandma Beard', was applied to a lady who had a growth of hair on the face; *tsirɛ sẹndc*, 'old bird', is universally applied to the aged Winter cacique of Nambé, although his real name is a compound of *tsirɛ*, 'bird,' with some other word.

Tewa of about the same age who are not intimately related are likely to call each other *ti'u*, 'younger brother or sister', and *pa'ᵊrɛ*, 'elder brother or sister'. Second or third cousins or other distant relatives of approximately the same age are also apt to call one another *ti'u* or *pa'ᵊrɛ*.

Mr Santiago Naranjo, governor of Santa Clara in 1911, has said: "I wish to see all these people calling each other brother and sister, uncle and aunt." Another Santa Clara Indian has

stated: "When people are drunk at a wedding one hears nothing but *ti'u*, *pa'ᵃrɛ*, *kc'c*, *kc'c'ɛ*, etc."

When people of one Tewa village greet those of another Tewa village, appropriate relationship terms are regularly used. On such occasions one also hears frequently the word *k'ɛmà*, 'friend.' Indians from non-Tewa pueblos and who do not speak Tewa are addressed by the Tewa in Spanish as *hermano*, *hermana*, *hermanito*, *hermanita*, *tata*, *tio*, *tia*, etc. Less frequently, perhaps, *compadre* or *amigo* are applied by the Tewa to alien Indians, these words being reserved for Americans or Mexicans if these be greeted at all. In the summer of 1910 the writer drove from Jemez to Bernalillo in company with an Isleta Indian. The Indian drove the team, the writer walked on ahead. Almost the entire population of Santa Ana pueblo passed us either singly or in groups of two to half a dozen. The Santa Ana people had been working in their fields by the Rio Grande and were bound homeward to attend a dance-festival to be held on the following day. Only one or two of all these Indians deigned to answer the writer when he bade good evening in a most friendly manner in Spanish, although the Isleta Indian who followed along behind was warmly greeted as *hermano*. The Tewa also frequently greet alien Indians by *k'ɛmà*, 'friend.' Such words as Tewa *k'ɛmà*, Jemez *kⁱ'àbâ*, Taos *'ąnpuiwai*, Santo Domingo *sáùkɛ*, meaning 'friend' are known to most Pueblo Indians, even though knowledge of some of the languages on the part of some extends no further.

Use of tata. As stated above, it is not certain whether this word is of Mexican or Tewa origin. It is used much by the Tewa both in speaking Spanish and Tewa. Its primary meaning appears to be 'father,' but it is applied indiscriminately to male persons a great deal older than the speaker. It is also used of God in the sense of Father. The corresponding Spanish feminine form *nana* appears not to be used in Tewa. Spanish *papá* and *mamá* appear also to be used in Tewa little or not at all.

Terms applied to the caciques

The Winter cacique is called *'cjikɛ*, 'ice hard' (*'cji*, ice; *kɛ*, hard). The Summer cacique is called *p'c'ɐ̨tɥjc*, 'water sitting governor'? (*p'c*, water; *'ɐ̨*, to sit?; *tɥjc*, chief, governor. The Winter cacique is the *tara*, 'father,' of the people; the Summer cacique is the *jija*, 'mother.' Whether the Winter cacique is also called *sɛ̨ndc*, 'old man,' and the Summer cacique *kwijc*, 'old woman,' could not be ascertained. But *sɛ̨ndcbi 'ɛ kwijcbi 'ɛ* 'old man's children and old woman's children,' is an expression heard in council and probably refers to all the people of the village who are considered to be the children of the Winter cacique and Summer cacique.

ti'upa'ᵃrɛ. In council this term is frequently heard. It means literally 'younger and elder brothers and sisters' and may perhaps refer to the members of a secret society or to the people of the village. Miss Freire-Marreco reports that she has heard the members of a council or general meeting addressed by the speakers as *ti'upa'ᵃrɛ*.

Officer. No other term than *pa'ᵃrɛ*, 'elder brother or sister', could be obtained with the general meaning of officer. Assistants to officers are called *k'c*, 'arms.'

Elders and novices in secret societies. It appears that in secret societies the elders are called *pa'ᵃrɛ*, 'elder brother or sister', and the novices *ti'u*, 'younger brother or sister'.

Member of secret society. A member of any one of the secret societies is called *pat'owà*, 'fish person'. In the plural *pat'owà* is applied to members of any one of the secret societies or those of all the secret societies collectively.

Principales. The Spanish word *principale* is applied (1) to the officers of a pueblo, (2) to the men of a pueblo who are or have been governors. The Tewa equivalent for "*principale*" is *pa'ᵃrɛ*, 'elder brother or sister'.

Monks and nuns. To these the word *pa'ᵃrɛ*, 'elder brother or sister', is regularly applied. This usage may be regarded as a translation of Spanish *hermanos, hermanas*. A novice in a cloister or convent might be called *ti'u*, 'younger brother or sister.'

"Father" as applied to God. Either *tara* or *tatà* renders' father' as applied to God. Contrary to the usage in some Pueblo languages *tara*, 'father' is not applied to the Sun or Moon, who are both masculine, and to whom *sẹndc*, 'old man', is applied. The Tewa do not speak of any "Sun-Father".

"Mother" as applied to a divinity. It is known that at least to one female divinity the name *jija*, 'mother,' is applied.

The Holy Virgin. To the Holy Virgin the name *sạntà 'a'ᵉñu* (*sạntà*, holy, < Sp. *santa; 'a'ᵉñu*, sex-age noun denoting a woman of about sixteen years of age) is applied.

Shaman. Shaman is called *wck'cndi'ⁱ*, 'medicine worker' (*wc*, medicine, magic; *k'cŋ*, to do; *'i'ⁱ*, particle denoting sing., animate gender).

Wizard, witch. Wizard or witch is called *tʃug'i'ⁱ*.

Roman Catholic priest. Two terms are in use: *'cqwa* (corruption of *'aqwa*, 'cloth trailer' (*'a*, cloth, vestment; *qwa*, to drag, to trail); *padrè* (< Sp. *padre*, father). Rarely *kurà* (< Sp. *cura*) also is used.

Term used in addressing the "abuelo." In addressing the personator of the *tsaƀijc* or *"abuelo" t'ɬɬɛ*, 'grandfather,' is invariably used.

Slave, captive. A captive or slave taken in war or otherwise is called *pậŋ*, diminutive *pậŋ'ɛ*. The Spanish terms are *cautivo, genizaro, esclavo.*

Family. No word meaning 'family' can be discovered.

Parents. The Tewa have no word meaning 'parents.' They must say *tara'a jija'a*, 'father and mother' or *jija'a tara'a*, 'mother and father' (*tara*, father; *'a* connective postfix; *jija*, mother, *'a*, connective postfix).

In Indo-Germanic languages words meaning 'parents' seem to have the original meanings of either 'those who give birth' (e. g., Latin *parentes*, Russian *radʲiтмï*), or 'elders' (e. g., German *eltern*).

Orphan. A person who has lost both parents by death is called *tarapi'i'ⁱ jijapi'i'ⁱ*, 'fatherless and motherless' (*tara*, father; *jija*, mother; *pi*, negative; *'i'ⁱ*, particle denoting sing., animal gender). For fatherless person *tarapi'i'ⁱ*, for motherless person *jijapi'i'ⁱ* is used.

Brothers and sisters, German *Geschwister*. If the brothers and sisters referred to are elder than self *pa'ᵃrɛ* must be used; if younger than self, *ti'u*. If both elder and younger than self such an expression as *pa'ᵃrɛ'a ti'u'a*, 'elder and younger brothers and sisters', must be used.

Person, people. The word *t'cwà* means 'person', 'people', and has several other meanings. See above.

Tribe. There is no word meaning tribe except *t'cwà*, 'people.' Such a circumlocution as *hą'ᵍmįnda t'cwà ŋgimų*, 'we are a single people' (*hą'ᵍmįnda*, singly; *t'cwà*, people; *ŋgi*, we 2+; *mu*, to be) may be used.

Clan. For 'clan' *t'cwà* is also employed. Thus *t'aŋt'cwà*, 'the sun people,' 'the sun clan' (*t'aŋ*, the sun; *t'cwà*, people).

Phratry, clan-group, division. *T'cwà*, 'people,' is also used with this meaning. Thus: *tɛnuri'įŋ t'cwà*, 'the winter division,' 'the winter people' (*tɛnuri*, winter; *'įŋ*, particle denoting 2+ plu., animal gender; *t'cwà*, people).

Somebody, anybody. As in many other languages expressions denoting 'somebody,' 'anybody' are derived from the numeral 'one' or from the interrogatives. Thus: *ŋga tc'ᵉbi tara*, 'somebody's father' (*ŋga*, as in *ŋgahą̂ŋ*, I do not know; *tc'ᵉ*, who, interrogative; *bi*, possessive; *tara*, father); *wɛnabi tara*, 'somebody's father' (*wɛna*, one; *bi*, possessive; *tara*, father).

Friend. The word meaning 'friend' is *k'ɛmà*. For uses of *k'ɛmà* see above.

Companion. Either *k'ɛmà* or *kcmpa* (< Sp. *compadre*) seems to be used.

Girl sweetheart. Several expressions are in use, such as *nabi 'a'ᵃñu* (*nabi*, my; *'a'ᵃñu*, maiden, virgin); *nabi 'ɛ* (*nabi*, my; *'ɛ*, son, daughter); *nabi hą̂ŋ* (*nabi*, my; *hą̂ŋ*, pulse, respiration, life, soul); *nabi hą̂ŋ'ɛ* (*nabi*, my; *hą̂ŋ*, pulse, soul; *'ɛ*, diminutive).

Enemy, warrior. The single word *hæmbi'ⁱ* means 'fighter,' 'warrior,' 'private, or public enemy.'

Brave man. The commonest expression with this meaning is perhaps *pįŋtæ'i'ⁱ*, 'brave one,' literally 'heart tough or elastic' (*pįŋ*, heart; *tæ*, tough or elastic; *'i'ⁱ*, particle denoting sing., animal gender).

Coward. The common expression meaning coward in war or otherwise is *k'ɻŋwcnda'ᵉ'i'ⁱ*, which cannot be clearly etymologized.

Ancient, person who lived long ago. The word *hewendi'ⁱ* means 'person who lived long ago.' It may also mean 'ancestor.'

Ancestor. Either *hewendi'ⁱ*, which properly means merely 'person who lived long ago,' or such expressions as *naɓi t'ɛlɛɓi papa*, 'my grandfather's great grandfather' (*naɓi*, my; *t'ɛlɛ*, grandfather; *ɓi*, possessive; *papa*, great grandfather).

Descendant. No used term could be obtained unless it be expressions like *naɓi t'ɛlɛ'ɛɓi papa'ɛ*, 'my grandchild's great grandchild', said by male (*naɓi*, my; *t'ɛlɛ'ɛ*, grandchild of grandfather; *ɓi*, possessive; *papa'ɛ*, great grandchild of great grandfather).

Giant. There are many legends about giants. They are called *t'cwàjc* 'great people' (*t'cwà*, person, people; *jc*, augmentative).

Dwarf. Tewa myths make much mention of giants but none of dwarfs, as far as has been learned. There are two expressions:

(*a*) *scpi'i'ⁱ* (*sc*, to grow up, to become adult; *pi*, negative; *'i'ⁱ*, particle denoting sing., animate gender);

(*b*) *mbɛgi'i'ⁱ* (*mbɛgi*, small and roundish; *'i'ⁱ*, particle denoting sing., animate gender).

Monster, deformed new-born child. There are only expressions such as *t'ǽki winą̂mɻpi*, 'it is not entire' (*t'ǽki*, entire, whole, perfect; *wi*, negative; *ną̂*, it; *mɻ*, to be; *pi*, negative).

Hermaphrodite. Of an hermaphrodite might be said: *kwi'a 'sɛnda ną̂mɻ*, 'it is woman and man' (*kwi*, woman in prime; *'a*, connective postfix; *sɛŋ*, man in prime; *'a*, connective postfix; *ną̂*, it; *mɻ*, to be).

Name. Any kind of a name or noun is called *k'ɕŋwǽ*.

Person who has the same given name as another. Miss Freire-Marreco gives the information that Santiago Naranjo of Santa Clara called Santiago Cantana of Cochití his "*tckajc*". This word is said by her to be applied to a person who has the same given or Christian name as another.

Dead person. A dead person is called *tʃu'i'ⁱ*, 'dead'. No milder term like 'blessed', 'departed', and the like could be discovered.

The presentation of Tewa relationship words given above is, because of lack of time, not what the writer would have liked to make it. The relationship terms of a number of Indian languages of southwestern United States have been completely recorded and for purposes of comparison should be presented together.

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THE ALLENTIACAN, BORORoAN, AND CALCHAQUIAN LINGUISTIC STOCKS OF SOUTH AMERICA

By ALEXANDER F. CHAMBERLAIN

I. Allentiacan

At the time of the Spanish conquest, the *Allentiacs*, or Huarpes (Guarpes), inhabited the plains about the great lagoons of Huanacache, extending probably to the western slopes of the Sierra de Córdoba and southward to the northern parts of San Luis and Mendoza. According to Boman (*postea*, p. 35), they were a savage people, unrelated to the tribes of the Andean valleys. Brinton[1] affined the Allentiac with the Millcayac, making them both Aucan (i. e., Araucanian) dialects. Mitre's critical study of Valdivia's grammar and vocabulary of Allentiac, however, seems to make certain the lexical and grammatical independence of this tongue, and to justify the recognition of an *Allentiacan* stock. The Millcayac was probably Puelchean. Boman (p. 36), without sufficient proof, sees in the Huarpes "the last remains of a people, who, much earlier, occupied vast regions of southern South America." The Allentiac and the Millcayac were the chief languages spoken in the old provinces of Mendoza, San Juan, and San Luis. The *Allentiac* was extinct in the 18th century. The principal literature concerning the *Allentiacan* linguistic stock will be found in the following titles:

1. Aguiar (D. S.). Los Huarpes. Buenos Aires, 1900; 2ª parte, Buenos Aires, 1904.
2. Boman (E.). Antiquités de la Région Andine de la République Argentine et du Désert d'Atacama, t. I, Paris, 1908. See pp. 33–37.
3. de la Grasserie (R.). De la langue Allentiak. Journ. de la Soc. d. Amér. de Paris, 1e s., t. III, 1900, pp. 43 ff.
4. Medina (J. T.). See de Valdivia (L.).
5. Mitre (B.). Lenguas Americanas. Estudio bibliográfico-lingüistico de las Obras del P. Luis de Valdivia, sobre el Araucano y el Allentiak, con un vocabulario razonado del Allentiak. La Plata, 1894, pp. 152.

[1] *American Race*, p. 323.

6. MITRE (B.). Catálogo razonado de la Sección Lenguas Americanas. Con una Introducción de Luis María Torres. Tomo I, Buenos Aires, 1909, pp. xliii, 411.

7. DE VALDIVIA (L.). Doctrina Cristiana y Catecismo, con un Confesionario, Arte, y Vocabulario de la lengua Allentiac, por el padre Luis de Valdivia de la Compañia de Jesus. Reimpreso todo á plana y renglon, con una reseña de la vida y obras del autor, por José Toribio Medina. Sevilla, 1894. Reprint of first edition published at Lima in 1607.

8. ——. Doctrina Christiana y Cathecismo en la lengua Allentiac que corre en la ciudad de S. Juan de la Frontera, con un Confesionario, Arte y Bocabulario breves. . . . Lima, 1607, pp. 47.

9. ——. Arte gramática, vocabulario, catecismo y confesionario en lengua Chilena, y en las lenguas Allentiac y Milcocayac, que son las mas generales de la Provincia de Cuio en el Reino de Chile, y que hablan los Indios Guarpes y otros. . . . Lima, 1908.

The work of Father de Valdivia, the basis of research in the *Allentiacan* language, gives "the Christian doctrine and Catechism in the speech of the Allentiacs of the city of San Juan de la Frontera, with a Confessionary, Grammar, and brief Vocabulary." This linguistic material has been discussed by de la Grasserie and Mitre, the former, in 1894, determining the *Allentiac* to be an independent stock. In 1909, Mitre[1] treats of the *Allentiac* in detail, summarizing (pp. 342–360) the data in de Valdivia as to grammar and morphology, and giving also (pp. 361–409) a vocabulary of Allentiac-Spanish, with etymologies and grammatical analyses where known.

The family name *Allentiacan* comes from *Allentiac* (*Allentiak*), the appellation of the language spoken by the people known likewise by this same term, as well as by the name of *Huarpes*, or *Guarpes*. Both these terms may be of non-Allentiacan origin. Boman (p. 36) suggests a derivation of *Allentiac* from Tehuelche (Tsonekan) *allen*, man, people, and thinks that *Huarpe* may be Aymaran,—but this is conjecture. Mitre,[2] who makes out *Huarpe* to be Aymaran, follows de Valdivia in the Tsonekan etymology adopted by Boman. The derivation of de Valdivia is not at all satisfactory. Boman also divides *Allentiac* into *Allen-tiak*, and suggests that the Hispanified *Diag-uita* may be cognate. This, again, lacks proof.

[1] *Catálogo*, pp. 339–409.

[2] Ibid., pp. 346, 347.

II. Bororoan

The territory of the *Bororoan* stock lies in central Matto Grosso, Brazil. Frič (1906) thus delimits it:

> "The Bororó inhabit the entire course of the São Lourenço river as far as its union with the Cuyabá, where they come into contact with the Guató. The northern boundary is formed by the north bank of the Rio das Mortes, the south bank being inhabited by the Cayapós, with whom the Bororó have long waged war. Farther north they occupy both banks of the Araguaya right across the road that leads from Cuyabá to Goyaz."

In the first half of the eighteenth century these Indians roved about the region of the Xingú-Araguaya watershed in central Matto Grosso. Later on, the so-called "Bororó Cabaçães" settled on the upper Paraguay. The others were for a long time known as "Coroados," and, as Ehrenreich notes, it was only in 1888, as a result of the visit of the second German Xingú expedition, that "the identity of these Indians with the genuine old Bororó was established." Their center was "between the sources of the S. Lourenço and the Cayapó Grande, the principal source of the Araguaya." At the time of von den Steinen's visit there were several hundred Bororó, settled under military supervision, at the colony of Theresa Christina on the São Lourenço. Many Bororó are in the service of the citizens of Cuyabá, and elsewhere. The Matto Grosso Bororó are distinguished as "Bororó da Campanha" (i. e., Bororó of the Plains) and "Bororó Cabaçães (i. e., Bororó of the river Cabaçal). Von den Steinen in 1894 described the former as "living in small settlements below Villa Maria on the right bank of the Paraguay and Jauru over toward Bolivia," while the latter "live not far from these northward on the banks and headwaters of the Cabaçal and the Jauru, both which rivers flow into the Paraguay from the right, the one at Villa Maria, the other somewhat farther south." The Bororó are termed by von den Steinen "the ruins of a once powerful people, who possessed the country between the Paraguay and the Cuyabá." The Bororó of the São Lourenço are still known as "Coroados." In 1848 the "Bororó da Campanha" were reported as numbering about 180, and the "Bororó Cabaçães" about 110; and by 1872 the latter had decreased to some 40, while the former were about the same.

(The corresponding numbers for the "Coroados" were not given.) Conflicts with the whites (1875–1880, and since) have further seriously reduced the number of these Indians.

In 1891, Brinton[1] classed the Bororós simply as a tribe of the Tupian stock, although the independent character of their language had been noted by von den Steinen some years before. In 1892, de la Viñaza, in his bibliographical monograph (p. 341) stated that "la lengua Bororó es de orígen desconocido." In 1894, von den Steinen, in his work on the aborigines of central Brazil (p. 517), expressly stated that the language of the Bororó is unrelated to any other.

The chief literature concerning the *Bororoan* linguistic stock will be found in the following titles:

1. Boggiani (G.). Etnografía del Alto Paraguay. Bol. Inst. Geogr. Argent. (B. Aires), 1898, vol. xviii, pp. 613-626, map.
2. ——. Vocabulario. MS. Printed in the article of Frič and Radin (q. v.).
3. Caldas (—). Vocabulario do lingua indígena dos Bororós Coroados. Cuyabá, 1899.
4. Cardús (J.). Las Misiones Franciscanas entre los Infieles de Bolivia, etc. Barcelona, 1886, pp. 425.
5. de Castelnau (F.). Voyage dans les parties centrales de l'Amérique du Sud. . . . Histoire du voyage. 6 vols. Paris, 1850–51. See vol. v.
6. Ehrenreich (P.). Anthropologische Studien über die Urbewohner Brasiliens. Braunschweig, 1897, pp. iv, 168.
7. Frič (V.) *and* Radin (F.). Contributions to the Study of the Bororo Indians. Journ. Anthrop. Inst. (Lond.), vol. xxxxvi, 1906, pp. 393–406.
8. Koslowsky (J.). Algunos datos sobre los indios Bororós. Rev. d. Mus. de La Plata, tomo vi, 1895, pp. 373–410.
9. ——. Tres semanas entre los indios Guatós. Ibid., tomo vi, 1895, pp. 221–250.
10. Melgaço (*Baron*). *See* von den Steinen (K.).
11. von Martius (C. F. P.). Beiträge zur Ethnographie und Sprachenkunde Amerika's zumal Brasiliens. 2 Bde., Leipzig, 1867. Bd. II: Wörtersammlung brasilianischer Sprachen, pp. xxi, 548.
12. Meyer (H.). Bogen und Pfeil in Central-Brasilien. Leipzig, 1896. Translated: Bows and Arrows in Central Brazil, in Rep. Smithson. Inst., Washington, 1896.
13. Montinho (J. F.). Noticia sobre a provincia de Matto Grosso. S. Paulo, 1869.

[1] *American Race*, p. 23.

14. VON DEN STEINEN (K.). Durch Central-Brasilien. Leipzig, 1886, pp. xii, 372.
15. ——. Unter den Naturvölkern Zentral-Brasiliens. Berlin, 1894, pp. xiv, 570.

Montinho (pp. 170–171) gives some words of the "Bororós-Cabaçães," and also a vocabulary of 32 words (pp. 192–194) of the "Coroados," but these latter belong not to the Bororó thus named, having been, as von den Steinen points out, taken from von Martius' work. They are really "Coroado of the Rio Xipoto," and altogether non-Bororó. The identity of the Matto Grosso "Coroados" with the Bororó was suspected by Melgaço and Cazal before von den Steinen's demonstration of it. Boggiani's vocabulary in Frič and Radin contains about 150 words, of which some are not to be found in Caldas or von den Steinen. In his work on *The Aborigines of Central Brazil* (pp. 441–518) von den Steinen furnishes an excellent ethnological sketch of the Bororó. Besides the few grammatical notes there given (p. 17), he also prints a German-Bororó vocabulary of some 300 words. Brief vocabularies are given in von Martius[1] and in Cardús, the former taken from de Castelnau.[2]

The family name, *Bororoan*, is derived from *Bororó* (Bororós), the term by which these Indians have long been known. Its etymology is uncertain.

III. CALCHAQUIAN

The character of the *Calchaquian* language and the extent of the territory occupied by those who once spoke it have been the subject of much discussion and even disputation. In 1891, Brinton (*Amer. Race*, pp. 319–320) recognized a "Catamareña" stock, to which he assigned the following tribes—*Acalianes*, *Cacas* (or *Cacanas*), *Calchaquis*, *Catamarcas*, *Diagitas* (or *Diachitas*), *Quilmes*, *Tamanos*. He identified the *Calchaquian* language with the *Catamareño* or *Cacana* tongue, a grammar of which was written by de Barcena, but suggested that further research might show that the Calchaquis "were a branch of the Araucanians." The *Calchaquian* culture, he thought, had been inspired by the Peruvian. Later,[3]

[1] Vol. II, pp. 14–15.
[2] Vol. V, p. 285.
[3] *Stud. in S. Amer. Nat. Langs.*, 1892, pp. 52–58.

he looked upon the *Calchaquis* as "a more or less mixed branch of the Kechua family," abandoning his former recognition of the language as an independent stock. This "identification of the *Calchaqui* dialect of Tucuman with a patois of the Kechua," is based by him partly on the fact that the Abbé Camaño speaks of a "*Calchaqui* or *Tucumano* or *Catamareño* dialect of Quechua." But it is admitted that the people of the *Calchaqui* country had abandoned their mother tongue (if they had one) for Quechua before the time of Camaño, so his evidence is hardly convincing. Von Tschudi's attempt to connect the *Calchaquian* language with Atacameñan, Ameghino's claim of Aymaran relationship, Lafone-Quevedo's view that it was a mixed or mongrel tongue (Kechuan-Abiponian-Guarani), etc., are all without sufficient proof. H. von Ihering holds to the theory of an independent stock as Brinton did formerly.

The importance of the ancient *Calchaquian* culture has recently been emphasized by Ambrosetti, Boman, and other investigators. Ambrosetti (1902, 1903) believes the territory of the *Calchaquian* independent stock to have included a good deal of the Argentine provinces of Jujuy, Salta, Tucuman, and Catamarca, with extensions farther south in La Rioja and San Juan, even to the borders of Mendoza. He thinks that the Inca element in *Calchaquian* culture has been exaggerated, and the native factor underestimated. He has also made out an interesting comparison between the *Calchaquian* culture and that of the Pueblo Indians of New Mexico and Arizona, but this does not necessarily imply any close racial or linguistic relationship of these two peoples—it merely emphasizes the effects of very similar natural environments upon the development of human civilization.

Léjeal and Boman (1906), in their discussion of the "*Calchaqui* question," identify *Calchaqui* culture with Diaguitan culture, holding that "the *Calchaquis* were not themselves a distinct nation, but belonged to the more important Diaguitan people, whose territory extended over all the Andine region of northern Argentina, from the peak of Acay and the valley of Lerma, on the north, to the province of San Juan on the south (the Sierra de Córdoba

excepted)." While recognizing the Peruvian element in Diaguitan culture, and that a very large one, these authors (p. 186) allow a considerable factor of independent origin. Later, Boman[1] discusses in detail the Diaguitas and their culture. He attributes to them, at the time of the Spanish conquest, all the mountainous region of modern Argentina, from the Nevado of Acay and the valley of Lerma, on the north, probably to the province of Mendoza, on the south; in this region must, however, be excepted the Sierra de Córdoba, inhabited by the Comechingones, whose culture, like that of the Diaguitas, seems to have had affinities with the Andine type, but who did not speak Cacan, the general language of the Diaguitas" (p. 12). Also, "the Diaguitas constituted an ethnic unity, not only from the point of view of their culture, but likewise linguistically; they all spoke a common language, the Cacan, Caca, or Kakan" (p. 10). Boman's map shows the extent of the *Calchaquian* or Diaguitan territory as above described.

In his later discussion of the subject Brinton[2] states that the *Calchaqui* or *Cacana* language "was merely a corrupt dialect of the widely extended Quechua stock," but admits that "it is possible that at the conquest some relics of an earlier tongue remained." Ehrenreich (1905) inclined to the opinion that the *Calchaquis* were a mixed people, as Lafone-Quevedo maintained. Taking all things into consideration, however, there still seems reason to believe in the independent character linguistically of the people in question, and they are here ranked as such—the *Calchaquian* linguistic stock, that term being preferred over *Catamareñan*, *Cacan*, *Cacanan*, or *Diaguitan*. At its greatest extent, the *Calchaquian* stock may be said to have occupied a territory of varying breadth, between about 23° 30′ and 32° 30′ S. lat. The *Calchaquian* language was still spoken in the seventeenth century; and Boman (p. 20) observes: "Lozano informs us that the Jesuit Hernando de Torreblanca was, in 1657, the only Spaniard who knew the language of the *Calchaquis*." Outes and Bruch (pp. 48–65) recognize the independent character of the *Caca* tongue, but reject the term *Calchaqui* as improperly applied to the Diaguitas.

[1] *Antiq. d. Rég. And.*, t. 1, 1908, pp. 12–32, etc.

[2] *Ling. Cartog. Chaco Reg.*, 1898, p. 27.

The chief literature concerning the *Calchaquian* linguistic stock will be found in the following titles:

1. AMBROSETTI (J. B.). La civilisation Calchaqui. Congr. Intern. d. Amér., XIIe sess. (Paris, 1900), 1902, pp. 293–297.
2. ——. Ressemblance entre les civilisations Pueblo et Calchaqui. Ibid., XIIIe sess. (N. Y., 1902), 1906, pp. 9–15.
3. ——. Antiguëdades Calchaquíes, Buenos Aires, 1902, pp. 97, repr. from vols. LIII and LIV of Anales de la Sociedad Científica Argentina.
4. ——. I Calchaqui, Roma, 1903, pp. 18, repr. from the Bollettino della Societá Geografica Italiana.
5. DE BARZANA (A.). The existence of works attributed to this writer is doubted by Boman (pp. 17–20), but Brinton (*Amer. Race*, p. 320) says a grammar of Cacana was written and perhaps published by him.
6. BOGGIANI (C.). Cartografía lingüística del Chaco, por el Dr Brinton. Rev. del Inst. Parag. (Asunción), 1899, pp. 106–137.
7. BOMAN (E.). Antiquités de la Région Andine de la République Argentine et du Désert d'Atacama. Tome I, Paris, 1908, pp. xi, 388. See pp. 12–32 on Diaguitas.
8. BRINTON (D. G.). The American Race. New York, 1891, pp. xvi, 392.
9. ——. Studies in the Native Languages of South America. Philadelphia, 1892, pp. 67.
10. ——. The Linguistic Cartography of the Chaco Region. Philadelphia, 1898, pp. 30.
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12. LAFONE-QUEVEDO (S. A.). Tesoro de Catamarqueñismos: Nombres de lugar y apellidos indios con etimologías y eslabones aislados de la lengua Cacana. Buenos Aires, 1898, pp. xliv, 377. Also in Anales de la Sociedad Científica Argentina, vols. XXXIX–XLI, 1895–1898.
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Whatever vocabularies, texts, etc., in the *Calchaquian* language may have been collected by the old missionaries, they are now lost or inaccessible, lying, perhaps, in unknown locations. The linguistic data remaining consist of place-names, etc., and these are discussed by Lafone-Quevedo, in his *Tesoro de Catamaqueñismos*, but not to the satisfaction of Brinton (*Ling. Cart.*, p. 26), who cites from him some of these words and terminations. Brinton cites a *Grammar of Calchaqui* as having been written (and published?) by the Jesuit missionary Alonso de Barcena (or Barzana), and other authorities cite a *Vocabulary* as well; but Boman (pp. 17–20) finds no such works in existence; careful investigation, e. g., showing that the *Vocabulario* stated by Graesse to be in Paris does not exist there at all (this was said to have been printed at Los Reyes in 1586). The *Lexicon et præcepta grammatica*, for which a date, "Peruviæ, 1590," is assigned by several bibliographers, is, according to Boman, a "made-up" title.

The family name, *Calchaquian*, comes from *Calchaqui*, the appellation of the most celebrated member of the stock, best known through its stubborn resistance to the conquering Spaniards. Its etymology is unknown. The language seems to have been called *Caca*, *Cacana*, etc.

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AN ANCIENT NEW JERSEY INDIAN JARGON

By J. DYNELEY PRINCE

Introduction

WHILE at Trenton as Acting Governor of New Jersey in 1912, the writer found in the vaults of the Department of State an old manuscript volume of deeds, pertaining to Salem county, N. J.[1] In this collection, inserted next to a deed bearing the date 1684, is "the Indian Interpreter," a list of 261 words and phrases in the English of the period and in a mixed dialect of the New Jersey Delaware language, the arrangement being at random with no attempt at alphabetical order. The material given in this list was published without comment in Lossing's *Historical Record* (vol. I, 1872, pp. 308–311), but so faultily, with so many misunderstandings of the original orthography, and with such a quantity of typographical errors, that the reproduction is of no service whatever to students of the Lenâpe. The writing in the manuscript is somewhat difficult to read for one accustomed only to modern script. Thus, there are many ambiguous characters, such as the similar capitals *S-L* and *R-K*, and the almost identically written *minusculæ n-r-v-s; l-h*, etc., so that a person entirely unacquainted with Lenâpe could hardly hope to make even an approximately correct transcription of the Indian words.

The list is of considerable philological interest, first, because it undoubtedly represents a Traders' Jargon, used between the Delaware River whites and the Indians, almost grammarless and based chiefly on English construction, like the Chinook and Eskimo traders' idioms of the North; and secondly, because the Delaware material, broken and erroneous as it often is, is not entirely Minsi. There can be no doubt that we have here Unami and Unalachtigo elements as well as Minsi. The following instances should be

[1] Salem Surveys, No. 2; stiff paper, yellow with age, in original leather binding.

compared: *nahaunum* 'raccoon' (below nr. 76); *miningus* 'mink' (80); *copy* 'horse' (83); *s* for *sch* in *singkoatam* (97); *s* for *tsch* in *singa* 'when' (110; 114); *r* for *l* in *ruti* 'good' (125); *raamunga* 'within' (135); *rhenus* for *leno* 'man' (227–228); *roanonhheen* 'northwest wind' (180), none of which words or peculiarities is of northern origin.[1]

Strangely enough, Brinton, in his *Lenâpé and their Legends*, makes no mention of this manuscript material in the Salem Records, although he knew of and commented briefly on the Traders' Jargon.[2] The jargon of the Salem Records and that given by Thomas[2] are identical, save that the former source is much fuller than the few specimens cited by Thomas.

The jargon words given by Thomas, which are not found in or are noticeably variant from the language of the Salem Records, are comparatively few and are as follows:[3]

apeechi 'quickly' = SR. √ *hapitcha* (117).

aroosise 'old' = Z. *mihilúsis* 'old man', from stem = 'decay'.

benoin(g)tid 'boys'; not a plural = Del. *pilwin* 'young (*pil*) one' (*win*) + the dim. √ *-til*. Note the interchange of *l* and *n*, Unalachtigo fashion.

beto 'fetch' = SR. *petto* (110).

chekenip 'turkey'; Unalachtigo form (Brinton, "Lenâpé", p. 37) = SR. *sickenom* (21).

chase 'skin' = SR. *hayes* (70). Palatalization of Del. *ches*. See below s. v. *kachi*.

chetena 'strong' = Z. *tschítanne* 'hard'; *ntschítannessi* 'I am strong'.

enychan 'children'; not a plural = Z. *nitschaan* 'my child'; Aben. and Pass. *nijan*.

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[1] Cf. J. D. Prince, The Modern Minsi Delaware Dialect, *Amer. Jour. of Philol.*, XXI, pp. 295–302.

[2] Op cit., pp. 75 ff., as instanced by Gabriel Thomas in his *History and Geography; Account of the Province and Country of Pennsylvania and West New Jersey in America*, London, 1698, a still accessible reprint of which appeared in New York in 1848.

[3] The following abbreviations have been used throughout this paper: B. = Brinton, *Lenâpé-English Dictionary*, Philadelphia, 1888; Z. = Zeisberger's *Indian Dictionary*, printed from the original manuscript, Cambridge, 1887; Pass. = Passamaquoddy; Aben. = Abenaki; A. = Albert Seqaqkind Anthony, collaborator with Brinton in his *Lenâpé-English Dictionary;* RW. = Roger Williams; SR. = Salem Records; OA. = Old Abnaki; P. = Prince. It should be noted that the phonetic system followed by the writer of the Salem Record is that of the English of the seventeenth century. Both Brinton and Zeisberger followed the German method of notation, with certain irregularities on the part of Brinton.

etka 'or' = *etek* 'where it may be'; used like the Germ. *sei;* Fr. *soit* for 'or'.

haloons 'shot' = SR. *alluns* (48).

kayly 'very' = B. *cheli* 'much'.

hita 'friend'; cf. SR. 58.

hodi 'farewell' = Eng. 'howdy'.

kabay 'horse' = SR. *copy* (58).

kachi 'how many' = Z. *kechi;* B. *keechi.* This guttural must have been pronounced with a strong palatalization to be represented by Eng. *ch*! Cf. below, *marchkec.*

koon 'winter' = SR. *coon* (16).

marchkec 'red' = Z. *mechksitschik* 'red ones'.

megis 'sheep' = SR. *mekis* (87).

mogy 'yes' = SR. *mochee* (98). Note the use of *g* in Eng. for the palatal sound.

moos 'cow' = SR. *muse* (85).

(*kee*) *namen* 'you see' = Z. *nemen;* common Algonquian stem.

neskec 'blue, black'; B. *nescalenk* or *nesgessit lenâpe* 'black men'.

nowa = Aben. *nawa*, a resumptive particle like Eng. 'now' at the beginning of a phrase.

ochqueon 'coat' = SR. *aquewan* (40). Was this palatal *ch* or a guttural? Most probably the latter owing to Dutch influence (?) on the notation.

opeg 'white' = SR. *sepeck* (41).

peo 'he will come' = SR. *payo* (133); *poh* (134).

squatid 'girls'. Not a plural; *squa(w)*, on which see SR. 234 + dim. *-tit.*

tongtid 'young' = Z. *tangeto* 'little'; B. *tangiti* + dim. *-tit.*

(*nee*) *weekin* 'I live, dwell' = Z. *wik* 'house'; common Algonquian *weesyouse* 'meat' = SR. *iwse* (81).

Perhaps the most interesting phonetic feature of this jargon, of which the present paper gives all that is now extant, is the interchange of *r* and *l*. It will be observed that the writer of the Salem manuscript gives *rhenus* and *leno* for 'man' (227–228); *ruti* and *olet* for 'good' (123; 125), showing that, even as early as 1684, the whites could hardly distinguish between the Indian *r* and *l*. The *r* was no doubt similar to the old Aben. *r* of Rasles' Dictionary, which is now everywhere represented by *l*, and also to the Iroquois *r* which is at present beginning to become *l* on the St Regis reservation in northern New York; i. e., the old Delaware *r* was a thick palatal which permitted a ready permutation to both *l* and *n*, as was the case in Unalachtigo (Brinton, *Lenâpé*, p. 38, and see just above s. v. *benoin(g)tid*). It should be observed, in studying the following comparisons, that both Brinton and Zeisberger used the German system of notation in writing the Lenâpe.

THE INDIAN INTERPRETER

1. *cutte* 'one'; B. *ngutti;* Z. *gutti.* The *n* is inherent; cf. Pass. *neqt* 'one'.
2. *nisha* 'two'; B. *nischa;* Z. *nischi.*
3. *necca* 'three'; B., Z. *nacha.*
4. *newwa* 'four'; B., Z. *newo.*
5. *palenah* 'five'; B. *palenach;* Z. *palénachk.*
6. *cuttas* 'six'; B. *guttasch;* Z. *guttaasch.*
7. *neshas* 'seavon'; B. *nischasch;* Z. *nischâsch.* The *-asch*-element corresponds to the *-ôz* of the Aben. in *nguedôz* 'six'; *tôbawôz* 'seven'. It must have denoted 'five', as *guttasch-nguedôz* 'six' = 'one', plus *-asch-ôz;* i. e., the first element is *gut-ngued* = Pass. *neqt* 'one'; while *nischasch-tôbawôz* 'seven' = *nisch* and Aben. *tôba-*, Pass. *taba* 'two', + *-asch-ôz;* viz., 'one and five, two and five', etc.
8. *haas* 'eight'; B., Z. *chaasch.*
9. *pescunk* 'nine'; B. *peschgonk;* Z. *peschgunk.*
10. *tellen* 'ten'; B., Z. *metéllen.*
11. *tellen oak cutte* 'eleven' = 'ten and (*oak*) one'; Z. *attach gutti;* i. e., *attach* = 'more'; it denotes *-teen.* Cf. nr. 183.
12. *tellen oak nishah* 'twelve'; Z. *tellet woak nische; attach nische.*
13. *tellen oak necca* 'thirteen'; Z. *tellet woak nacha; attach nacha.*
14. *tellen oak newwa* 'fourteen'; Z. *attach newa.*
15. *tellen oak pallenah* 'fifteen'; Z. *attach palénach.*
16. *tellen oak cuttas* 'sixteen'; not given by Z.
17. *tellen oak neshas* 'seventeen'; not given by Z.
18. *tellen oak haas* 'eighteen'; Z. *attach chaasch.*
19. *tellen oak pescunk* 'nineteen'; Z. *attach peschgunk.*
20. *nissinach* 'twenty'; Z. *nischinachke.*
21. *sickenom* 'turkey'; B., Z. *tschíkenum* (A. "archaic").
22. *kahake* 'goose'; B., Z. *kaak* 'wild g.' (A. *kaág*).
23. *quing quing* 'duck'; B. *quiquingus.* Onom.
24. *neckaleekas* 'hen'; seems onom. The nearest equivalent is B. *quekolis;* A. *wékolis* 'whip-poor-will'. Mod. Del. *kikipisch;* Z. *gigibis;* probably a reduplication of the Dutch *kip*(*pen*) 'chicken(s)'.
25. *copohan* 'sturgeon'; RW. *kauposh;* Aben. *kabasa;* connected with Z. *copachcan* 'thick, stiff'. Note OA. *kabasse* 'closed in'; same stem as Del. *kpahhi* 'close'; see below nr. 138.
26. *hamo* 'shad'; I cannot place; B., Z. *schawanámmek.*

72. *hwissameck* 'cattfish'; B. *wisamek* (A. = 'fat fish'; archaic; at present *wahlheu* 'mud-fish'); Z. *wisameek*.
28. *sehacameck* 'eele'; B. *schachamek;* Z. *schachameek* (lit. 'it is a straight one').
29. *cakickan* 'pearch'; I cannot place. Perhaps should be read *cakielan*, same stem as B. *machkalingus;* Z. *moechkalingus* 'sun-fish'(?).
30. *lamiss* 'fish'; B. *names;* Z. *namees*.
31. *weeko* 'suet, tallow'; B. *wikul* 'fat in animal's belly'; Z. *wikull*.
32. *pomee* 'grease, fat'; B. *pomih;* Z. *pomi*.
33. *kee mauhulome* 'wilt thou buy'? Z. *mahallammen;* B. *mehallamen* 'buy'. Cf. nr. 99.
34. *kecko kee wingenum* 'what wilt thou have'? *kecko* = Z. *köcu;* B. *kolku* 'what, something'. The root *wing-* appears in B. *winginamen* 'delight in'; Z. *wingilendam;* Aben. *n'wigiba-losa* 'I should like to go', etc.
35. *keck soe keckoe kee wingenum* 'say what hast thou a mind to'. The *-soe* is clearly identified with the indefinite Pass. *-ws* in *ke'kws* 'what, anything'.
36. *ne wingenum* 'I have a mind to'.
37. *kake* 'wampum'; Z. *gequak;* B. *gock.*, but A. (Mod. Del.) *keekq*.
38. *sewan* 'wampum'; perhaps Z. *schejeek;* B. *schejek* 'string of w.' (A. 'edge, borer').
39. *alloquepeper* 'cap, hat'; B., Z. *alloquepi*.
40. *aquewan* 'coate, cloak or wollen cloak'; B. *achquiwanis* 'blanket'; Z. *achquiwanes*.
41. *wepeckaquewan* 'a white match-coat'; the element *wepeck* 'white' = B. *wapsu* 'white'; Z. *woapsu*. "Matchcoat" meant 'leather coat'; Z. *machtschi-lokees* = 'leather string'.
42. *himbiss* 'cloath, lynnen'; cf. Z. *hembsigawan* 'tent'; lit. 'a cloth dwelling'; or 'where one dwells in cloth' (*wig* 'dwell').
43. *sackutackan* 'breeches'; Z. *sackutáckan;* B. *chessachgutackan* 'leather br.'
44. *cockoon* 'stokings'; B., Z. *gagun*.
45. *seppock* 'shoes'; root appears in Z. *nemach-tschipachquall* 'Indian shoes'.
46. *piackickan* 'gun'; B. *paiachkikan* 'gun'; lit. 'one fires it off'; from *paiach-kammen* 'fire off'. Contains Eng. 'fire' = *paia;* cf. Chinook Jargon word *piah* 'fire'. The consonant *f* is foreign to many Indian languages.
47. *punck* 'powder'; B. *ponk* 'dust' (A. 'ashes, powder'); Z. *atta neponggomiwi* 'I have no powder'.

48. *alunse* 'lead'; B. *alluns* 'arrow' (A. first 'arrow'; then 'bullet'). Proper word for 'lead' was *tákachsin* 'soft stone' (P.).
49. *assin* 'stone, iron, brass' (i. e. 'anything hard'; P.): B. *achsin;* Z. *achsün.* In Del. 'iron' was *sukachsin* 'black stone' (P.); Z. *sukachsün.*
50. *assinnus* 'kettle, pot'; a jargon word from *assin* 'stone, iron,' etc.; B., Z. *hoos* 'kettle'.
51. *tomohickan* 'ax'; Z. *t'mahican;* B. *temahikan.*
52. *quippeleno* 'hoe'; B. *achquipelawon.*
53. *pocksucan* 'knife'; A. *pachschikan.*
54. *tocosheta* 'pair of sissers'; contains root of B. *kschikan* 'knife'.
55. *shauta* 'tobacco'; B. *kschatey.*
56. *hapockon* 'pipe'; Z. *hopoacan; achpiquon.* A. "archaic".
57. *brandywyne* 'rum'; proper word; *lilenowokgan;* Z.
58. *netap* 'friend'; really 'my friend'; cf. Pass. *nitap, kitap* 'my, thy f.' The full phrase here in the ms. seems to be *hiyotl netap* 'good be to thee friend', or 'thou good friend'. This *hiyotl* appears to be a part of the verb 'to be' = *hiyo;* cf. *yu* in Aben. and Pass. 'it is', and probably the root of *wul-* 'good'. The sentence is indistinct.
59. *tackomen* 'whence camest thou' = *ta* 'where' + *k*, 2 p. + *omen* 'come from'; cf. Z. *tacúmen;* same meaning.
60. *tacktaugh matcha* 'whither goest thou'?; Z. *matchil* 'go home'; but in Pass. *mach, maj* is the common root 'to go'. *Tacktaugh* = *ta* 'where' + *k* = 2 p. + *ktaugh*, same element seen in Pass. future *kti.*
61. *tana ke-matcha* 'whither goest thou'? Cf. Pass. *tan* 'where, whither'. Cf. nr. 221. *Tana* = 'when', 119.
62. *Undoque* 'yonder' (little way); B. *undachqui* 'whereabouts'; *undach* 'here, this way'. Cf. 113–222.
63. *kecko lwense* 'what is thy name'? Really = 'his name'. B. *lŭwunsu* 'he is called'; Aben. *liwizo;* Pass. *w't-lēwis.* Cf. nr. 206.
64. *hickole* 'yonder'; Z. *ikalisi;* B. *ika talli.*
65. *kecko kee hatta* 'what hast thou'?; B. *olhatton* 'have, possess'. Cf. nr. 194.
66. *matta ne hatta* 'I have nothing'; B. *matta* 'no, not'. Cf. nr. 95.
67. *nee hatta* 'I have'.
68. *cutte hatta* 'one buck'; lit. '(I) have one'; 'buck' = *ajapeu;* B. and Z.
69. *nonshuta* 'doe'; B. and Z. *nunschetto.*
70. *hayes* 'skin' (not dressed); B. *ches;* Z. *choy.*

71. *tomoque* 'beaver'; B. *ktemaque;* Aben. *tama'kwa.*
72. *hunnikick* 'otter'; B. and Z. *gúnamochk.*
73. *mwes* 'elk'; B. *mos;* Z. *moos.*
74. *mack* 'boar'; I cannot place; B. gives *welchos* 'stallion, boar'. It is possible that the writer meant to write *wack* which might be a corruption of *welchos.*
75. *hoccus* 'fox'; Z. *woakus* 'gray fox'. Note the mod. N. J. place-name *Hohokus,* still translated "many foxes". This is probably an abbreviation of *hôkusak* 'foxes'.
76. *nahaunum* 'raccoon'; Z. *náchenum.* The Minsi word was *espan* (cf. A. in Brinton), a word which still lives in the Jersey Dutch of Bergen County *hāspân;* cf. J. D. Prince, The Jersey Dutch Dialect, Dialect Notes, vol. III, part vi, p. 479.
77. *linqwes* 'wild cat'; Z. *tschinque.* In the Minsi of the north, a form similar to the Pass. *lox* 'wolverene' must have existed, as we find the word *kātelôs* for 'wild cat' in Jersey Dutch (Prince, op. cit., p. 484).
78. *hannick* 'squirrel'; Z. *anicus* 'fence-mouse' = 'ground squirrel' or 'chipmunk'.
79. *tumaummus* 'hare'; Z. *tschemammus.*
80. *miningus* 'a minks' = 'mink'; Z. *winingus.* This seems to show the derivation of the Eng. *mink;* Swed. *mänk* from the Delaware dialects.
81. *Iwse* 'I use meat' or 'flesh'; really 'meat'; B. *ojoos;* Z. *ojos.*
82. *kush-kush* 'hog'; B. and Z. *goschgosch;* onomatapoeia.
83. *copy* 'horse'; I cannot place. The proper word was B. *nenajungus;* Z. *nechnajungees. Kabay* is given by Thomas (see above Introduction).
84. *ninnenuggus* 'mare'; Z. *nechnaungési ochquechum* = 'horse female'.
85. *muse* 'cow'; B. *mos;* now = 'deer' and 'elk' (A.).
86. *nonackon* 'milk'; I do not believe there ever was a Delaware word for 'milk'. This word in B. = *nonagan;* Z. *nunagan* 'nipple, mamma'.
87. *makees* 'sheep'; B. *mekis,* onom. from *memekis* 'bleat'.
88. *minne* 'drink' or 'ale'; B. *menen* 'drink'; *menewagan* 'drinking'; Z. *menewoacan* 'drink' (n.).
89. *pishbee* 'small beer'; Z. *mbil* 'beer'. Contains the root *-bi* 'water'.
90. *hosequen* 'corne'; Z. *chasqueem;* B. *mesaquem* 'ear of c.'
91. *pone* 'bread'; B. and Z. *achpoan;* B. *nd-apponhe* 'I make br.' This word survives in the Amer. South for 'corn-bread'.
92. *hoppenas* 'turnips'; B. *hobbin* 'potato'; Z. *hobbenis* 'turnip', with dim. *-s.*

93. *seckha* 'salt'; Z. *sikey* (A. "archaic").
94. *kee wingenum une* 'dost thou like this'; *une* = B. *won* 'this'.
95. *matta* 'no'; B. and Z. *matta* 'no, not' = the neg. *atta* with *m*-prefix.
96. *me matta wingeni* 'I don't care for it'; note the Eng. *me* in the jargon for Del. *ne-ni* and also the neg. *-i*.
97. *singkoatum* 'I do not care'; 'I will cast it away'; B. *schingattam* 'be unwilling, disapprove'.
98. *mochee* 'ay, yes'; Z. *moschiwi* 'clearly'; Z. gives *bischi* 'yes, indeed'.
99. *Me mauholumi* 'I will buy it'; again Eng. *me* as above; Z. *mahallammen;* B. *mehallamen* 'buy'. The *-i* here may be a relic of the 1 p. *-i* = 'I will buy it for myself' (?).
100. *ke manniskin une* 'wilt thou sell this'? The stem *mahal* = 'sell'; cf. Z. *na* (sic! = *ne-*) *mahallamagentsch* 'I will s. it'. In Aben., however, *manahômen* = 'sell'; clearly same stem as here.
101. *kecko gull une* 'how many guilders for this'? On *kecko*, see nr. 34; *gull* 'guilder'; Dutch *gulden*.
102. *kako meele* 'what wilt thou give for this'? The root *mil* is common Algonquian for 'give'; cf. Pass. *ke'kw k'milin wechi ni* 'what wilt thou give me for this'?
103. *cutte wickan cake* 'one fathom of wampum'; cf. B. *newo wikan* 'four fathoms'.
104. *nee meele* 'I will give thee'; should be *k'milen*, Z.; cf. Aben. *k'milel*. Cf. nr. 144.
105. *cutte steepa* 'one stiver'; Dutch *stuiver*.
106. *steepa* 'farthing' = 'stiver'.
107. *cutte gull* 'one gilder; sixpence'.
108. *momolicomum* 'I will leave this in pawn'; must contain root *mol*, seen in Z. *wulatschi-mol-sin* 'treat about peace'.
109. *singa kee natunnum* 'when wilt thou fetch it'? Z. *tschinge* 'when'; B. *naten* (A. 'go after something'); Z. *n'natammen* 'I will fetch'.
110. *singa kee petta* 'when wilt thou bring it'? Z. *pêtoon* 'bring'.
111. *necka couwin* 'after three sleeps; 3 daies hence'; Z. *gauwin* 'sleep' (cf. nr. 183).
112. *tana kee natunum;* see 109.
113. *undoque* 'yonder'; see 62.
114. *singa* 'when'; Z. *tschinge*.
15 *iucka* 'day'; really B. *juke* 'now'; *juke gischquik* 'to-day'. Cf. nrs. 129; 257.
116. *kis quicka* 'this day; a day'; B. *gischquik;* Z. idem.
117. *hapitcha* 'by and by'; Z. *pecho;* B. *apitschi*.

118. *alloppan* 'to-morrow'; Z. *alappa;* A. *ajappa.*

119. *tana hatta* 'when hadst thou it'? *Tana* 'whither' (61) = Pass. *tan* 'what, where, when'.

120. *quash matta diecon* 'why didst thou lend it'? B. and Z. *quatsch* 'why'; note Z. *k'nattemihi* 'lend me'. The ms. form must be for *k'natladikon* 'he lends it to thee'; cf. Aben. *k'mil'gon* 'he gives it thee'.

121. *kacko pata* 'what hast thou brought'?; B. *petou;* Z. *pêtoon* 'fetch'. Note the absence of the personal prefix.

122. *cuttas quing quing* 'six ducks'; cf. nrs. 6 and 23.

123. *olet* 'it is good'; B. and Z. *wulit.*

124. *matta olet* 'it is bad'; lit. 'it is not good'.

125. *matta ruti* 'it is good for nothing'; *matta* 'not'; *ruti* = *luti* = the stem *wul-* + the neg. *-i.*

126. *husco seeka* 'it is very hansom'; B. and Z. *husca* 'very'; Z. *schiki* 'handsome'.

127. *husco matit* 'it is very ugly'; Z. *machtit* 'ugly'.

128. *ke runa matauka* 'thou wilt fight'; quite a wrong translation: *ke runa* = *kiluna,* the incl. 'we'. The plural 'you' would have been *kiluwa;* 'thou' = *ke-.*

129. *Iough matcha* 'get thee gone'; lit. 'now go'; *iough* = B. *juke* 'now'; cf. nr. 115; *matcha* 'go depart'; cf. nrs. 60; 61.

130. *undoque matape* 'sit yonder'; Z. *bemattachpil* 'sit'.

131. *ne mathit wingenum* 'we will be quiet'; really 'I will', etc.; *mathit* must be a corruption of Z. *clammieche* 'be still, lie quiet'; B. *klamachpin* (?). Note the apparent use of *wingenum* 'wish', for the future. The jargon reproduces the guttural by *th;* cf. nrs. 235; 260.

132. *noa* 'come hither, come back'. Probably from B. *nawochgen* 'follow', seen also in the resumptive *nawa.*

133. *payo* 'to come'; B. *paan;* Z. *peu* 'he comes'.

134. *match poh* 'he is come; coming'. This use of *match-* to denote the present action is common in Aben. and Pass. Note Z. *peŭ* 'he comes'.

135. *raa munga* 'within'; Z. *allamunque. raa-m* = *lam* in Aben. and Pass. *lami* 'within, inside'.

136. *cochmink* 'without'; B. *kotschemunk;* Z. *kotschmunk;* Pass. *kotchmek.*

137. *tungshena* 'open'; Z. *ntunkschemenen* 'I open it'; B. *tenktschechen; tonktschenemen.*

138. *poha* 'shut'; B. *kpahi;* A. *kpahhi;* Pass. *k'baha.*

139. *scunda* 'the door'; Z. *esquande* = *Eingang*.

140. *ke cakeus* 'thou art drunk'; Z. *achkienchsu* 'a drunken man'.

141. *opposicon* 'beyond thyself' = 'drunk'. Probably = B. *achpussin* 'broil, roast'; here = *achpussikan* 'he broils him; he is broiled'; slang (?).

142. *husko opposicon* 'much drunk'.

143. *mockorick* 'a great deal' = B. *mechakgilik* 'great'; *macheli; mecheli* 'more'.

144. *maleema cacko* 'give me something'; *mil* 'give' (see nr. 104); the form should be *milil* 'give me'; Aben. *milin*.

145. *abij; bee* 'water'; Z. *m'bi;* B. *mbi;* Aben. *nebi*.

146. *minatau* 'a little cup to drink in'; *men* is a common Algonquian stem 'to drink'; B. *menachtin* 'drink together'.

147. *mitchen* 'victuals'; B. *mizewagan;* Z. *mizewoagan*.

148. *mets* 'eat'; Z. *mizin;* and cf. Aben. *mits* 'eat'.

149. *poneto* 'let it alone'; Z. *ponih* 'leave off, let it alone'; B. *ponemen* 'let go, leave off'. Cf. Pass. *pon'mont'hāg'n agwed'nuk* 'put the paddle in the canoe'.

150. *husco lallacutta* 'I am very angry'; seems to mean 'irritated'; Z. *lalha* 'scrape'; B. *lalhan*. Properly 'angry' was B. *manunxin*.

151. *ke husko nalan* 'thou art very idle'; Z. *nolhandowoagan* 'idleness'; B. *nolhand* 'lazy'.

152. *chingo ke matcha* 'when wilt thou go'? *tschinge'* 'when'; cf. nr. 109.

153. *mesickecy* 'make hast'; *schauwessin;* Z. *schauwessi;* probably *mesickecy* is for *wesickecy*, a corruption of the *-wessin* element in the above words (?).

153*a*. *shamahala* 'run'; *B. kschaméhellan* 'fast'.

154. *husko taquatse* 'it is very cold'.

155. *ne dogwatcha* 'I am very cold; I freeze'. With these words, cf. B. *tachquatscho* 'he is cold, shivering'; Z. *tachquatschúwak* 'they freeze' (see 156).

156. *whinna* 'snow, hail'; Z., B. *wineu* 'it snows'; same stem seen in Z. *guhn* 'snow' (see just below). *Whinna* cannot mean 'hail', which was *tachsigin*.

157. *ahalea coon hatta* 'have abundance of snow, hail, ice'; *ahalea* = B. *allowiwi* 'more'. *Coon* = Z. *guhn* 'snow' (156).

158. *take* 'freeze'; B. *taquatten* 'frozen'; *taquatschin* 'freeze'.

159. *suckolan cisquicka* 'a rainy day'; B. *sokelan* 'it rains'; Z. *socelantsch* 'it will rain'; Aben. *soglôn* 'it rains'.

160. *loan* 'winter'; Z. *lowan;* B. *loan*. Cf. 180.

160*a*. *sickquim* 'the spring'; B., Z. *siquon;* Z. *siequangge* 'next spring'; Pass. *signak* 'in spring'.

161. *nippinge* 'summer'; really 'next summer'; B., Z. *nipen.*

162. *tacockquo* 'the fall'; B. *tachquoak.*

163. *tana ke wigwham* 'where is thy house'; B. *wikwam;* Z. *wiquoam.*

164. *hockung kethaning* 'up the river'; B. *kittan* 'great (tidal) river'. The last element *-tan* is the same as that seen in *manhattan* = *m'na'tan* 'an island surrounded by tidal water' = *-tan.* The word *hockung* must have meant 'down (the river)', as it = *hakink* 'on the earth, down, under'. Upstream = *nallahiwi,* B.

165. *tana matcha ana* 'where goes the path'? B. *aney* 'road, walking road, path'. Cf. nr. 200.

166. *iough undoque* 'go yonder'; lit. 'now there'; cf. nr. 115.

167. *hitock* 'a tree'; Z. *mehítuk.*

168. *hitock nepa* 'there stands a tree'; Z. *nípu* 'he stands'.

169. *mamanhiikan*
170. *mamadowickon* } 'peach or cherry'; I cannot place.
171. *manadickon*

172. *virum* 'grapes'; both B. and Z. *wisachgim;* probably should read *visum* (?).

173. *acoletha* 'apple'; must be the same stem as Z. *achquoací-lennees* 'blackberries'; no doubt a misapplication. Both B. and Z. give *ãpel* for 'apple'.

174. *hosquen* 'corne'; Z. *chasqueem;* B. *chasquem.*

175. *cohockon* 'mill'; B. *tachquahoakan;* Z. *tachquoahoácan.*

176. *locat* 'flower or meale'; B. *lokat;* Z. *lócat.*

177. *keenhammon* 'grind it'; B. *kihuhammen.*

178. *nutas* 'bag, basket'; B. *menutes;* the ending *-notey* occurs in Z. *hembinotey* 'bag of linen'. This *nt*-root is seen in Pass. *b'snud;* Aben. *abaznoda* 'basket', lit. 'a wooden bag' (Pass. *epus;* Aben. *abazi* = 'wood, tree').

179. *poquehero* 'it is broke'; B. *poquihilleu.*

180. *roanonhheen* 'a north-west wind'; Z., B. *lowanáchen* 'north wind'; lit. 'winter-wind'; cf. nr. 160.

181. *ruttehock* 'the ground will burn and be destroyed'; B., Z. *lúteu* 'it burns'; *haki* 'earth'.

182. *hockcung* 'a chamber'; lit. 'on the ground'; cf. nr. 164. B. gives *wikwamtit* 'chamber'; lit. 'little (*-tit*) house'.

183. *quequera qulam tananst oke cowin kee catungo* 'where I look for a place to lie down and sleep, for I am sleepy'. This phrase

appears on three lines in the ms. and was thus copied by Lossing. The sentence seems hopelessly corrupted, probably by the original scribe. I can find nothing to indicate what was meant by the words *queguera qulam tananst*, except by supposing that in *tananst* we have some form of the stem seen in *ndoniken* 'he seeks me'. *Oke* is 'and' = *woak;* cf. nr. 11. *cowin* 'sleep' = Z. *gauwin;* cf. nr. 111. The words *kee catungo* = 'thou art sleepy' and not 'I', as above. They were either wrongly introduced here, or else the whole phrase should be in the 2 p. It may be noted that the *q* in *queguera* and *qulam* may be indications of the 2 p. = *k*.

184. *aloppan* 'to-morrow'; cf. nr. 118. This probably goes with what follows.

185. *ne hattunum hwissi takene* 'I will go a-hunting in the woods'; in two lines in the ms. With *ne hattunum hwissi*, cf. Z. *ndochwilsi* 'I go hunting'. The usual root is *allauwi;* cf. J. D. Prince, "The Modern Minsi Delaware Dialect," Amer. Journ. of Philol., XXI, pp. 294–302. 'In the woods' was properly *tékenink;* B., Z. *tékene*.

186. *attoon attonamen* 'goeing to look for a buck'; *attoon* = Z. *achtu* 'deer'. This word probably is concealed in the modern corrupt form *Tuxedo* which the Marquis de Chastellux in 1785 translated 'there are plenty of deer'; i. e., *Tuxedo* possibly = *achtuhuxítonk* = B. *achtuhu* 'there are many deer' + *-xit* 'where one gets them' + the loc. *-onk* = 'place where one gets many deer'. *Attonamen* is from *naten* 'go after something'. The form should be *n'naten* 'I seek him' (anim.); (*n*)*attonamen* is inanimate and wrong here.

187. *matcha pauluppa shuta* 'I have catcst (*sic*!) a buck'; B. *palippawe* 'buck' and Z. *tchunásu* 'catched' (*sic*!) from which *shuta* is obvious. The entire phrase means 'I am going (*matcha;* nr. 60, for *nee matcha*) a buck to catch'.

188. *accoke* 'a snake'; B., Z. *achgook;* Aben. *skok*.

189. *mockerick accoke* 'rattlesnake'; lit. 'big [see nr. 143] snake'. Z. *wischalowe* = 'rattlesnake' (= 'frightener'; A.).

190. *husko purso* 'very sick'; *purso* = B. *palsin;* same stem seen in 191.

191. *tespahala* 'small-pox'; B. *despehellan;* Z. *despéhelleu*. Stem is *pa*(*h*)*al*, *pehel* 'be sick', seen in B. *pal-sin* (nr. 190).

192. *nupane* 'the ague'; lit. 'it comes again'; B. *nohenopenowágan* 'the sickness which recurs again' (A.).

193. *singuope* 'hold thy tongue'; perhaps a corruption of B. *samuttonen* 'close the mouth'. The proper word was *tschitgussin* (Z.) = 'be silent'.

194. *singuap hockin hatta* 'be quiet, the earth has them; they are dead'. Earth = Z. *hacki;* B. *haki.* Cf. nr. 65 for *hatta* 'have'. The *-in* may be for the loc. *-ing, ink.*

195. *sheek* 'grass or any green herb' (should be *skeek*); B. *askiquall, skiquall;* Z. *masgik;* B. *maskik.* Cf. Pass. *m'skí'kwul* 'grasses'.

196. *hocking* 'the grounds'; Z. *hacki;* B. *haki* 'earth'; lit. 'in the earth'. Cf. Pass. *ki;* Aben. *a'ki*, etc.

197. *hockehockon* 'plantation'; Z. *hakihácan.*

198. *nee tukona* 'my country'; also from *hacki;* viz., *n* of the 1 p. + the intercalated *-t-* before a vowel or soft *h* + the element *uk-ak* = *hacki.*

199. *ourilta* 'plaine; even; smooth'. This is simply *wulita* 'it is good', specially applied to land here. Properly 'plain' was B. *memgukek* (A. *schimgek*).

200. *oana* 'a path; highway'; B., Z. *aney.* See nr. 165 spelled *ana.*

201. *singa mantauke* 'when we fight'; *tschinge* 'when' (see nrs. 114; 152); B. *machtagen;* Z. *machtágeen* 'fight'. There is no indication of person in this phrase.

202. *ne holock;* Eng. not given (see nr. 205).

203. *ne rune husco hwissase* 'we are afraid'; should be 'much (*husco*) afraid'. *Ne runa* = *niluna*, the exclusive 'we'; cf. nr. 128, for *kiluna* the incl. 'we'.

204. *opche hwissase* 'always afraid'; Z. *abtschi* 'always'.

205. *ne olocko toon* 'we run into holes'; verb-form, really 1 p. pl. excl. from Z. *woalac;* B. *walak;* A. *waleck* = 'a hollow, excavation; not a hole which penetrates'. Nr. 202 above *ne holock* probably meant 'my hole' and was construed as 'arse-hole'; hence, the modest writer of the ms. left the English blank. The regular Del. word for 'arse-hole' was *saputti;* cf. J. D. Prince, "Dying American Speech Echoes from Connecticut," Proc. Amer. Philos. Soc., XLII, p. 351.

206. *keeko kee lunse une* 'what dost thou call this'? Note *keeko;* should probably be read *kecko* (cf. nr. 34); *kee* = *2* p. sing.; on *lunse*, see nr. 63.

207. *checonck* 'looking-glass'. The usual expression was B., Z. *pepenaus* 'mirror', from *pipinamen* 'differentiate, choose'. The Natick word for 'mirror' was *pepenautchitchunkquonk;* Narr. *pebenochi-chauquánick* 'the thing by which one sees a reflection'. *Checonck* of the jargon ms. seems to contain the final element of a Del. word akin to these long combinations just indicated.

208. *powatahan* 'a pair of bellows'; an inversion of Z. *putawoágan.*

209. *itcoloha* 'a cradle', for Z. *tchallan* 'Indian bedstead'; wrongly. *tschallaan* in B.

210. *mamolehickon* 'book or paper'; B. *mamalekhikan* 'writing, letter' (A. "in crooked lines or stripes"); from *lekhammen* 'write'.

211. *leecock* 'table, chair, chest'; evidently from *liechen* 'lie down'; Z. *liwíchin* 'rest'. Apparently a jargon word (?).

212. *sepussing* 'creek'; diminutive locative of *sipo* 'river'; Aben. *sibo.*

213. *kitthaning* 'river'; B. *kittan*; see nr. 164. *kitthaning* is loc. 'at the river'.

214. *moholo* 'a canoe'; B. *amochol;* Z. *amóchol.*

215. *rena moholo* 'a great boat or ship'; perhaps for *lina(quot) amochol* 'it is like a canoe' (?).

216. *taune kee hatta* 'where hadst thou it'? On *taune* see nr. 61; on *hatta,* nrs. 65; 194.

217. *ne taulle ke rune* 'I will tel thee'; verb-form from stem *öl;* cf. Z. *kt-öl-len* 'I tell thee'. Here in the jargon they used the 1 p. + 3 p. *ne taulle* = *nt-öl-e;* lit. 'I tell him,' and added *ke runa* = *kiluna;* see nr. 128.

218. *ne maugholame* 'I bought it'; B. *mehallamen;* see nr. 99.

219. *ke kamuta* 'thou hast stolen it'; Z. *com moot; com mootgeen* 'stolen'; *kemodgéwak* 'they have st. it'.

220. *matta ne kamuta* 'no, I did not steal it'; see nrs. 66; 95 for *matta.*

221. *taune maugholame* 'where dist thou buy it'? See nrs. 61; 99.

222. *A. B. undoque* 'yond of A. B.' See nrs. 62; 113.

223. *B. C. sickomeele* 'B. C. will give me so much for it'. Z. *ta-uchtend-chi* = 'how much'? A. *keechi* 'how much'. The *si-* element must be the *chi* in *keechi; komeele* = *k'mlli* 'you give me'. The correct translation is probably 'B. C., how much will you give me'?

224. *sawwe* 'all'; Pass. *m'siu;* Aben. *m'ziwi.* The proper Del. word was B. *wemi;* Z. *weemi.*

225. *hockung tappin* 'God's'; lit. 'on earth (*hockung*) is God' (*tappin* = Pass. *tepeltek;* Aben. *tabaldak* 'lord').

226. *manitto* 'the Devill'; B. *Manitto* (A. 'spirit'); cf. Z. *manitlowáhalan* 'bewitch'.

227. *renus* 'man' = *lenno;* see. nr. 228. The *-s* here is diminutive.

228. *leno* 'man'; B. *lenno.*

229. *peray* 'a lady' = *pelay;* same element as in Pass. *pil-* 'young', seen in Pass. *pil-skwessis* 'young woman, girl'. *Peray-pelay* really means 'young female'.

230. *penaesit* 'boy'; for *penae-tit* = B. *pil-wessin* 'be a boy' (see nr. 229). The ending *-tit* is diminutive.

231. *issimus* 'a brother'; should probably be connected with Pass. *nsiwes* 'my brother'. This is the same stem seen in Z. *schiess* 'uncle'. Z. gives *nimat, kimat* 'my brother, thy brother'.

232. *runcassis* 'cousin'; B. *longachsiss* 'cousin', but A. = 'nephew'.

233. *mitthurrus* 'husband'; must = *witthullus* 'her husband'; same stem as in B. *allewussowagan* 'majesty, supremacy'. Cf. nr. 242.

234. *squaw* 'a wife'; a jargon word from the Natick *squaw* 'woman'. The kindred Del. was B. *ochque;* Z. *ochqueu.*

235. *noeck* 'father'; Z. *nooch* 'my father'; *ochwall* 'his father', etc. Note the hardening of the guttural and cf. nrs. 260–261.

236. *anna* 'mother'; perhaps a jargon word. The proper Del. was B. *gahowes;* Z. *gahowees.*

237. *haxis* 'old woman'; corruption of Z. *chauchschiessis.*

238. *aquittit* 'little girl'; B. *ochque-tit;* lit. 'little woman'. Ignores guttural.

239. *kins kiste* 'a maide ripe for marriage'; corruption of *choanschikan* 'virginity'.

240. *papouse* 'a sucking child'; a jargon word from the Natick, as nr. 234. Del. was B. *nonetschik;* Z. *nohulentschik* 'children'.

241. *munockon* '[?] or a woman'; ms. indistinct. This is probably B. *allamachtey* 'womb, inward parts' (?), and denotes the *pudendum feminæ.*

242. *qualis* 'a master'; *k'welis* 'thy master' from *allewus,* as in nr. 233.

243. *tollemuse* 'servant'; *w't-allemus* 'he hires (sends) him'; cf. B. *allogagan* 'servant'; Z. *allogáman* 'he is sent'. Is *allum* 'dog' from this stem? Cf. Aben. *w'd-alemos* 'his dog'.

244. *wheel* 'the head'; Z. *wihl;* B. *wil.*

245. *meelha* 'the hair'; Z. *milach;* pl. *milchall.*

246. *skinch;* Z. *wuschking;* B. *wuschgink* 'eye'; cf. Natick *skizucks.*

247. *hickywus* 'the nose'; Z. *wickíwon;* B. *wikiwon.*

248. *twn* 'the mouth'; B., Z. *wdoon.*

249. *wippet* 'the teeth'; Z. *wipüt;* B. *wipit.*

250. *pentor* 'the ear or hearing' = *k'pentol* 'I hear thee'; B. *pendamen* 'hear'; Z. *necama k'pendak* 'he hears thee'.

251. *quaquangan* 'the neck'; Z. *ochquecanggan.*

252. *nacking* 'the hand'; B. *nachk;* properly 'my hand'.

253. *ponacka* 'the hands'. I cannot explain the prefix.

254. *wotigh* 'the belly'; B. *wachtey.*

255. *hickott* 'the legs'; Z. *wickaat.*

256. *ceet* 'the foote'; B. *w'sit;* Z. *w'chsiit.*

257. *iucka* 'a day'; B. *juke* 'now'; Z. *jucke.* Cf. nrs. 115, 129.

258. *kishquecon* 'a week'; B. *gischquik.*

259. *kisho* 'a moneth'; B., Z. *gischuch* 'month'.

260. *cothtingo* 'a year'; B. *gachtin;* Z. *gachtün.* Note the rendering of the guttural in the jargon by *th.* Cf. nr. 235.

261. *passica catton* 'a halfe yeare'; B., Z. *pachsiwi* 'half' + *catton* = B. *gachtin;* Z. *gachtün.* Here the guttural is ignored in the jargon. Cf. nr. 235.

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THE MEXICAN MAIZE SEASON IN THE CODEX FEJÉRVÁRY-MAYER

By STANSBURY HAGAR

THE writer has referred in a previous paper to the group of asterisms which Duran pictures as governing the eighteen months of the Mexican year. He indeed sometimes describes these asterisms as planets governing the days of these periods, but elsewhere compares them with our zodiacal signs, and a careful reading of the text makes it clear that he refers to the eighteen Mexican zodiacal asterisms.[1]

In this sequence the signs Cancer, Virgo, and Libra are represented respectively by a man standing in flowing water beside a growing maize plant, an emerald (symbol of the Maize Goddess), and a mummy (symbol of the Death God). In the Borgiano and related codices Cancer, Leo, Virgo, and Libra are figured as the Water Goddess, Tezcatlipoca, the Maize God, and the Death God.[2]

On sheets 33 and 34 of the Codex Fejérváry-Mayer, Loubat edition, there are two sequences of interrelated symbols which support these identifications by associating the signs as named with the maturing of the maize crop upon the Mexican plateau.

It is not possible to specify the particular portion of the plateau to which these figures refer, nor is this necessary for our purpose. One writer has suggested the probability that this codex pertains to the Mixtecan or Zapotecan region because of its use of the Maya numeration by bars and dots with the Nahuatl symbols. It suffices for us that there are parts of the plateau where the seasons correctly correspond with the symbols to be described. And the correspondence between the astronomical symbols of the various nations

[1] Duran, *Historia de las Indias de Nueva España*, vol. II, Mexico, 1880. Hagar, Zodiacal Elements of the Mexican and Maya Months and Day Signs, *Int. Cong. Americanists*, Mexico, 1910 (not yet published).

[2] Hagar, Elements of the Maya and Mexican Zodiacs, *Int. Cong. Americanists*, Vienna, 1908, p. 277 et seq.

of Mexico and Yucatan is sufficiently marked to justify comparison between them and between the deities with whom they are associated.

On the lower half of the sheets named (pl. XXXIV), reading from right to left in the usual manner, we see the sequence of deities described above standing with upturned faces before a temple and holding in their right hands an offering to the celestial powers, except that the Sun God takes the place of the Water Goddess. But it is not difficult to see why the Sun God equally pertains to the sign Cancer, for the symbols of this sign are the fire-sticks with which the new fire was lighted at the time of the June solstice, when the sun was supposed to attain his greatest power in the northern hemisphere. At this time at Izamal, in Yucatan, and elsewhere, the sun was represented as an ara of fiery plumage which descended upon an altar at the solstitial noon to consume the offerings there. Both the ritual and the myth evidently refer to solstitial worship of the Sun God, and on sheet 12 of the Cospiano codex he is depicted facing the solstitial temple of light, within which is the fiery ara. This may explain the bird-head above the head of the Sun God, though, according to Seler, the quetzal is represented instead of the ara. Moreover, on the roof of the temple before which the Sun God stands in the Fejérváry-Mayer codex we see the emerald, symbol of the Water Goddess, whose Nahuatl name is *Chalchiuitlicue*, the Emerald Woman. Above the Sun God is the solar disk surrounded by a fiery cloud—the fiery sun of the June solstice. There are also flowers upon the temple roof, and within the temple sits a deity believed by Seler to be the Flower God. He may represent the outburst of flowers with the coming of the rains at this season.

On the lower left side of sheet 33 we see the god who corresponds to the Nahuatl deity Tezcatlipoca presenting the offering, while a puma-head deity sits within the temple. Both Tezcatlipoca and the puma are used as symbols of Leo in the Borgiano Codex group.

In the third group on the right of sheet 34 the Maize God holds the offering, and a variant form of the same deity sits in the temple before a dish which probably contains maize grains. A fruit-bearing plant issuing from the headdress of the standing deity may indicate

the harvest season. The maize deity pertains to Virgo in the Borgiano group. Finally, on the left of sheet 34 the Death God holds the offering before a temple in which the Death Head with the protruding tongue rests upon a chair. This doubtless represents the Nahuatl *tlahtouani*, or oracular priest, who announces the wisdom supposed to be obtained by communion with the spirits of the dead. He and the Death God symbolize the two signs Libra and Scorpio in the Borgiano group and elsewhere.

Passing now to the upper row of figures, the first on the right depicts the Water Goddess supporting a leaning maize plant which is personified as a man and is rooted in water. Above the goddess a cloud tree pours rain upon the burnt offering. The identity of these symbols with the Cancer symbols below them and with Duran's Cancer asterism is evident, so we may interpret them as referring to the upgrowth of the young maize under the influence of the first rains in June and July. In fact Duran, referring to this asterism, writes that the wet season now began and the crops increased in size. In the second tableau on the left the sky is half clouded, half light, suggesting the showers of August. The maize plant, now much more erect, is still supported by a deity, here perhaps a form of the Maize God, who seems to be urging it upward. In the third tableau on the right of sheet 34 the maize plant is now fully erect, and the dark tips of the two ears depict the black corn-silk which marks its ripening. This is the Nahuatl *Xochitl Icacan*, the "Place where flowers stand upright," the paradise of the deities governing food supplies. It is a form of the Tamoanchan, or Garden of the West, the place of origin.[1] A comparison of this symbol with the Tianquiztli, or Market Place, of Sahagun's Virgo asterism reveals a common basic symbolism associated with the productive forces of Nature. In the drawing before us the maize plant is now figured as a woman richly clothed, doubtless the Goddess of the Maize. It is supported by the Rain God, who has brought it to maturity. In Duran's figure a man holds a maize ear with ripe silk. These symbols should correspond in the sequence with the sign of the Maize God, our Virgo, and with the month of September.

[1] Seler in Cod. Fejérváry-Mayer, p. 124.

The following drawing represents a small, unfertile plant bearing a single ripe ear. It is attacked by four birds and a mouse, from which it is protected by a warrior deity. The interpretation is not difficult. The sun passes out of the fertile month and sign of the Maize Deity of the harvest into the dry and barren months and signs of Libra and Scorpio. The rains cease and vegetation begins to wither and die, hence the association with death symbols. But in October a scanty harvest of later ripening is still saved from the attacks of birds and mice by the husbandman, who drives them away from his fields.

According to Señor Don Valencia, Director of the Central Agricultural Station of Mexico, whose statement has been kindly procured for me by Prof. Manuel Gamio, of the National Museum, there are many regions on the Mexican plateau where maize can be and is sown in March and reaped in September, although today this is not customary, as maize can be grown with less risk before the season of heavy rains. It is an interesting question whether these pages of the Codex Fejérváry-Mayer refer to a ceremonial growing of maize in harmony with the supposed influences of the zodiacal asterisms.

Thus it will be noted that the symbolism of the maize harvest depicted upon the upper half of the sheets mentioned may harmonize with the actual maize season of the Mexican plateau, and that the symbols of each season correspond equally well with those of the zodiacal sign that governs it and which is represented directly below. One day-sign accompanies each of the upper drawings, and five day-signs each of the lower drawings. They undoubtedly refer to some more complex calendric symbolism associated with the sequence of the four signs just described. Only one of them is placed with the zodiacal sign to which it pertains astronomically. But Dr Seler correctly associates the four drawings both above and below with the cardinal points—east, north, west, and south, respectively. Cancer, the dawn sign of the solar year, with its new-fire symbolism, naturally represents the dawn or eastern sign. The Leo asterism is called the Wheel of the North, and its day-sign Eecatl is probably associated with the cold north wind. The

Maize Deity, Tamoanchan, the Western Paradise, and the day-sign Calli, or House, all Virgo symbols, pertain emphatically to the west. This leaves Libra to represent the south, and, though the symbolism here is not so clear, the death attributes of this sign may represent the passage of the sun into the southern signs of drought and dying vegetation.

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CHANGES IN THE BODILY FORM OF DESCENDANTS OF IMMIGRANTS

By FRANZ BOAS

UNDER this title I have published the results of my investigations on the anthropometry of immigrants and their descendants, undertaken for the United States Immigration Commission. A partial report was asked for by the Commission and submitted to Congress on December 16, 1909, and published about March, 1910. It was stated in the report (p. 6) that the investigation was not complete. An abstract of the complete report was submitted to Congress on December 3, 1910, and issued on March 17, 1911. The final report was presented on December 5, 1910, by the Secretary of the Commission, submitted to Congress on June 8, 1911, printed in September, 1911, and issued in May, 1912. It was reprinted and published by the Columbia University Press in New York in 1912.

I may summarize the principal results of this investigation as follows:

1. American-born descendants of immigrants differ in type from their foreign-born parents. The changes which occur among various European types are not all in the same direction. They develop in early childhood and persist throughout life (Partial Report, pp. 7–16; Abstract, pp. 11–28; Final Report, pp. 55–56, and tables, pp. 10–55).

2. The influence of American environment makes itself felt with increasing intensity, according to the time elapsed between the arrival of the mother and the birth of the child (Partial Report, pp. 17–22; Abstract, pp. 29–37; Final Report, pp. 57–64, 99–115).

3. The observations on intraracial heredity show an increased variability of children of dissimilar parents, which proves a regression of the children to either parental type, not a regression to the mid-parental type (Abstract, pp. 54–55; Final Report, pp. 76–78, 153–154).

4. The head measurements show the same acceleration of growth during the prepubertal period as has long been known for measurements of the bulk of the body, i. e., stature and weight (Abstract, pp. 55–57; Final Report, pp. 78–79, 137–151).

5. The average stature of children decreases with the size of the family (Partial Report, p. 28; Abstract, p. 57; Final Report, pp. 79–80, 161–166).

Incidentally a number of problems were touched upon which are, however, of secondary importance in relation to the whole problem, and the investigation of which was necessary for the correct interpretation of the observations referred to before.

The comparison of immigrants and their descendants necessarily refers to groups which immigrated at different periods. For instance, 15-year old American-born boys are children of parents who immigrated more than 15 years ago; while 15-year old foreign-born boys are children of parents who immigrated less than 15 years ago. If, therefore, the constitution of the immigration representing a certain people changed, there would be an apparent change of type, which in reality would reflect only the differences in type of the immigrants of various periods. The investigation in question showed the following:

6. Individuals who immigrated in any particular year and the descendants of mothers who immigrated in that year show the same differences in type as have been observed for the whole series (Abstract, pp. 44–46; Final Report, pp. 65–69, 108, 111, 113).

7. Foreign-born parents when compared with their own foreign-born and American-born children exhibit the same types of differences for the children as the whole series (Partial Report, pp. 44–50; Abstract, p. 47; Final Report, pp. 69–70, 117–128).

8. When the Hebrew boys are classified according to their pubescence in groups of about equal physiological development, the same differences persist (Partial Report, pp. 25–28; Abstract, pp. 38–43; Final Report, pp. 126 et seq.).

9. It seems that after the panic of 1893 a decrease in the general development of the Hebrew immigrants appeared, which continued for several years (Partial Report, pp. 28–29; Final Report, p. 65).

		AGES																						
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Bohemians, Poles, Hungarians, Slovacs	males	15.4	16.0	14.9	15.3	14.4	13.7	13.9	13.7	13.2	12.3	12.6	11.7	12.0	11.1	12.6	10.2						
	females	15.8	15.2	14.9	15.5	14.6	14.2	13.8	13.5	13.5	12.9	12.0	13.1	12.8					11.0				
Hebrews	males	12.5	13.5	11.7	12.1	10.6	10.1	10.5	10.1	10.0	9.6	9.3	9.3	9.7	9.0	8.4				7.5			
	females	12.6	12.0	11.8	12.1	11.4	10.7	11.4	10.7	11.3	10.1	10.4	9.6	10.1					9.0				
Sicilians	males	10.2	10.9	10.0	10.4	8.4	9.4	9.0	8.5	7.9	8.5	7.8	8.6	6.3	6.0	7.5	8.0	7.6	5.9	5.6	6.3	6.1	5.6
	females	10.6	10.7	10.3	10.4	10.5	9.4	8.9	9.2	8.3	7.4	6.9	8.3	7.7	7.5	6.4	6.5	6.9	6.9	5.9	6.5	6.8	6.0
Neapolitans	males	11.3	10.6	11.3	10.7	10.3	9.6	8.8	9.0	8.3	8.2	8.1	8.0	7.7	8.5	6.5	6.4	7.9	7.2	8.2	6.2	4.0	5.6
	females	11.1	11.3	11.3	11.1	10.6	9.9	10.1	7.9	9.0	8.4	8.8	7.5	7.8	8.3	8.1	7.2	5.9	7.9	8.3	7.7	8.9	6.5

10. I think the investigation on color of hair also deserves special mention. Basing my inquiry on the assumption that the variations of hair color in any particular people follow the exponential law, I have shown that numerical values for pigmentation can be obtained (Final Report, pp. 93–98). I have divided the whole series of pigmentation from black to ash-blond in 20 equidistant steps, 0 being black, 20 ash-blond, but not without pigment like the hair of albinos. In this manner the results given in the accompanying table showing the degree of darkening with increasing age were obtained.

According to this table in the male the darkening amounts to nearly 5 units—one-fourth of the whole scale of colors. If the amount of darkening of females in the first two groups is less, we have to allow for the dyeing of hair, which is practised by many women, and also for the use of false hair by married Jewesses. For this reason I do not lay great stress upon the figures obtained from observations on adult females, except among the Italians. It would seem as though among them the hair of women averages a little lighter than that of men. This apparent difference may, however, be due to the lighter color of the tips of the long hair of women. The process of darkening progresses at least until the twenty-

sixth year, if not longer. An attempt to calculate the annual amount of darkening for the Hebrews shows this very clearly. For dark-haired as well as for light-haired groups the darkening amounts to about 0.2 points a year.

My conclusions have been assailed by a number of critics. The questions here summarized seem of sufficient importance to justify a reply to the various objections raised.

I must apologize to anthropologists familiar with the methods of anthropometry for the space taken by a discussion of the criticisms by Mr Radosavljevich, which appeared in the July–September, 1911, number of this journal, pages 394–436 (issued in February, 1912), in which the author assumes the pose of an expert, with what right will appear from the following remarks. Since the *American Anthropologist* submits contributions before acceptance to the judgment of authorities, and since, nevertheless, the article has found its way into the journal, it would seem that a discussion of certain elementary facts of anthropometrical method may be useful not alone to the reader unfamiliar with the subject.

Before entering into the various criticisms, I have to make a few general remarks on Mr Radosavljevich's paper. Among other recriminations he accuses me of inaccuracy of calculations (l. c., p. 412). It is unfortunate for his argument that the disagreements in calculations are solely due to the faulty method that Mr Radosavljevich has applied in taking his arithmetical means. He gives each value equal weight, while, as is taught in elementary arithmetic, each should be given a weight according to the number of cases of its occurrence. The second discrepancy that he has found (p. 422) is due to his faulty arithmetic.

In sharp contrast to his criticisms based on my failure to quote literature,—which I deem unnecessary when the works quoted do not serve a specific purpose germane to the work in hand,[1]—is his

[1] On page 427 he accuses me of misuse of literary evidence. He enumerates without critique the opinions of authors who have claimed that the cephalic index during growth decreases, or that it is stationary, or that it increases. He objects then to my statement that it decreases. The proof is given in the Abstract, pp. 55–57, which Mr Radosavljevich never mentions, and more fully in the Final Report, pp. 137–151. The conclusion that because I do not quote certain literature, I do not know it,

own failure to take notice of the abstract of my Final Report which appeared eleven months before the publication of his review, and the misleading inaccuracy of his quotations. Thus, on page 425, he reproduces from page 11 of my Partial Report, three headforms, and says (p. 427): "These sketches of headforms are, therefore, based not on his [Boas's] measurements but on pure imagination," suppressing my note which is found in the text and in the legend of the sketches in question: "These sketches are intended only to give an impression of the change in proportions. They do not represent the headform in detail."

Again on page 423 he alleges he has found "a few more" errors in tabulations, but repeats, as new, statements made previously by him on page 417. (In regard to these tabulations see p. 540.)

On page 421 he says: "We are surprised indeed that he has not a single table in his appendix referring to Sicilians, yet throughout his report he comes again and again to his discovery that very short-headed Jews are becoming 'long-headed' and very 'long-headed' Sicilians 'short-headed.'" He mentions this matter again on page 410. Still I say expressly in the Report which he reviews (p. 30) that "the present report is based only on a partial discussion of the Hebrew material and the generalized averages of the Sicilians and Calabrians."

He continues on page 421: "Instead of these [tables relating to Sicilians] he gives tables occupying eleven full pages, relating to his old study of the stature of Toronto children, and having no connection at all with his study of the descendants of immigrants." He does not say that the tables were to elucidate an entirely new point, the dependence of stature upon size of family (Partial Report, p. 28), which has a direct relation to the problem in hand and for the elucidation of which the tables are necessary.

Another complete change in my meaning is brought about through omissions in the following quotation from page 39 of my

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shows a curious lack of logic. In the Abstract, pp. 55–56 (also Final Report, pp. 144 et seq.), Mr Radosavljevich might have found utilized the literature which he quotes. I refer him also to my discussions of the subject in *Science*, N. S., IV, 1896. pp. 50–51.

Report (l. c., p. 394). Words printed in italics have been omitted by Mr Radosavljevich.

"*The changes in the amounts of measurements for different periods are, however, so irregular, that even with the numbers thus obtained no very clear results appear. It would seem that* on the whole there has been a decrease in the length of the head, width of the head, and width of the face since the middle of the last century, *but the change that has taken place is rather slight.* A feature that is particularly noticeable is the general drop of all the absolute measurements after the year 1894. An attempt to combine all the material, adult and children, for these years, brings out the sudden drop after 1893 even more clearly; and a similar phenomenon is repeated between the years 1907 and 1909. For this reason I am inclined to believe that the type of immigrants is directly affected by financial panics. *This can be due only to a selection that takes place in Europe, and which may also be affected by the return emigration from the United States to Europe. The material, so far as it has been discussed, does not give a definite answer to this important question, the solution of which would require a series of parallel measurements taken in Europe.*"

Throughout his article he assumes that this statement, which is only an incident in my work, is the main thesis of my report.

I. Method of Measurement

So far as I am aware the only objections raised against the method of measurement are those made by Mr Radosavljevich in the article quoted (pp. 419, 420, 423). He objects to lack of sharp definition of age, length of head, width of head, width of face, stature, and weight, data and measurements which are at present taken on the living according to uniform methods,—namely, age according to the usage of European languages as age at last birthday, the head and face measurements as maximum measurements, length of head from the glabella, stature and weight in stocking feet and without clothing,—unless different methods are specifically stated, as on pages 65 and 82 of my Final Report. Nobody misunderstands these methods, of which numerous examples may be found in anthropological literature. As a matter of fact Mr Radosavljevich

himself understands them, too, for on page 420 he speaks of length and breadth of head without any specification, assuming that the reader knows what he means.

Similarly his objection to lack of definition of physiological development (p. 423) is groundless. The statement (Partial Report, p. 34), "At the same time observations were made on pubescence as a means of determining the approximate physiological development. The method of these observations has been developed by Dr C. Ward Crampton," should make it clear to anyone that Dr Crampton's methods were followed. The description of this method is found in Dr Crampton's publications. Mr Radosavljevich might have read on page 33 that Dr Crampton himself organized the work in the schools.

More serious is the question of the accuracy of the observations. He states that "Bertillon, Martin, and other anthropometricians" (myself included) "require from their students an exactness for the length and breadth of the head within the limits of about 1 mm. If the difference is as much as 2 it is regarded as a discrepancy beyond which measurements cease to make identification of the subject measured possible, and if it is over 2, mistakes of a serious character are made beyond which non-identity can be made. The personal equation of Boas' thirteen observers who made successive measurements by way of preliminary practice on each other is in every observer above 0.5 mm." (p. 420). The last statement is incorrect. In reality the distribution of personal equations of the observers in regard to those head and face measurements was as follows (Final Report, p. 92):

0–0.4 mm.	31 times	2.0–2.4 mm.	1 time
0.5–0.9 "	29 "	2.4–2.9 "	– "
1.0–1.4 "	12 "	3.0–3.4 "	1 "
1.5–1.9 "	3 "		

Among these the two highest groups are represented by very few individuals only (17 for 2.2, 38 for 3.3), and the personal equations have therefore a very small weight.

Mr Radosavljevich distinguishes neither between error of

observation and personal equation nor between the effect of errors of observation upon an anthropometrical series and the effect of such errors upon measurements made for the purpose of identifying individuals. The personal equation is due to peculiarities in the method of measuring—like habitual differences in the choice of terminal points of the lines measured, or greater or lesser pressure. We try to eliminate these by practice, although they can never be entirely overcome. The error of observation is due to accidental errors affecting each measurement. While in measurements taken for the purpose of identification all errors *must* be restricted to a very low limit, equal accuracy is not *absolutely necessary* in measurements intended as a description of a series. We shall see later that most series can be adequately described by two values: the average and the mean square variability. In all these cases errors are admissible that do not influence either of these values beyond the limits of their accuracy. The mean square variability is determined as the square root of the average of all the squared deviations from the average; or, if the average is called a, the difference between any observation and the average x, the variability σ, the number of observations n, $\sigma = \pm \sqrt{\Sigma x^2/n}$, where Σx^2 indicates the sum of all the values of x^2. Then the mean square error of the average may be expressed by $\epsilon = \pm \sigma/\sqrt{n}$.

According to the theory of probabilities this means that we may bet as follows, that the true average of an infinitely long series lies between

$a - \epsilon$	and	$a + \epsilon$	68	against	32
$a - 2\epsilon$	"	$a + 2\epsilon$	95	"	5
$a - 3\epsilon$	"	$a + 3\epsilon$	99.5	"	0.5

The accuracy of σ^2 is measured in the same way by the error of $\pm \sigma^2 \sqrt{2/n}$.

In a sufficiently long series an accidental error of observation has no effect upon the average. For the mean square variability σ_1 of the series which is affected by an accidental error of observation whose mean square is δ we have

$$\sigma_1^2 = \sigma^2 + \delta^2$$

The value of σ_1^2 will remain within the limits of its mean square error as long as

$$\delta^2 < \sigma^2 \sqrt{2/n}$$
$$\delta < \sigma \sqrt[4]{2/n}$$

Thus we find the following admissible maxima for δ:

For	$n = 100$	$\delta < 0.378\sigma$
	$n = 200$	$\delta < 0.316\sigma$
	$n = 800$	$\delta < 0.224\sigma$

For the length of head σ is about 6 mm. Therefore, the mean square error of observation which will still leave the variability within the limits of its mean square error is, for a series of

100 observations	2.4 mm.
200 "	1.9 "
800 "	1.3 "

Furthermore, a certain maximum value can be shown to exist for the exactness of anthropometric measurements. The process of rounding off to the nearest millimeter results in a mean square error of the variability of nearly ± 0.3 mm., provided the actual measures are evenly distributed over the fractions of millimeters. Taking further into consideration the varying consistency and the consequent unequal yielding to pressure of the soft parts covering the skull and zygomatic arches, and the irregularities of the form of the occiput with its sharp or irregular ridges, an exactness of more than ± 0.5 mm. is practically impossible to obtain. In individuals whose true measure lies on a half millimeter it will always be more, owing to the process of rounding off.

Considering the effect of rounding off, the following approximate mean square errors of the length of head result for the various observers, calculated from the table on page 85 of the Final Report:

Le.	± 0.4 mm.	M. F.	± 0.5 mm.
Br.	± 0.5 "	Ja.	± 0.5 "
O. S.	± 0.5 "	T. M.	± 0.5 "
Rp.	± 0.5 "	H. L.	± 0.5 "

Be.	± 0.7 mm.	L. W.	± 0.8 mm.
L. F.	± 0.7 "	Lu.	± 0.8 "
A. G.	± 0.8 "		

It thus appears that the accuracy is nearly the maximum attainable, and certainly entirely within the limits of the accuracy of the variability.

When it is the object of anthropometric studies to compare the variabilities of different series, this may generally be done without hesitation, so long as the increases of all the variabilities due to the accidental error of observation are the same, particularly since their accuracies are only slightly affected. A case of this kind occurs in our study in the discussion of heredity (pp. 153 et seq.).

The personal equations of the observers, given on page 92, are also without influence upon our results, since in the foreign-born and American-born of the same series care was taken to have the same observers represented with approximately the same relative frequency of observations.

Mr Radosavljevich also criticizes me (p. 415) for not measuring the height of the head, on account of the gratuitous assumption that it might have yielded more important results than other measurements. My reason is clear and simple: the measurement of the distance between vertex and ear, which has to be measured as a projection on the median plane of the body, is so inaccurate that I do not use it on the living. In this I am in the good company of other experienced anthropologists, like Professor von Luschan.

On page 424 he reproaches me for using a scale of colors of hair that I arranged myself, instead of using the colors of Fischer, which proved impracticable on account of their greenish tinges. In my Final Report a special chapter is devoted to this subject (pp. 93–98), in which I explain that my aim was a numerical determination of pigmentation, and a numerical determination of the increase of pigmentation with age, a study which had not been made before.

He also thinks there is no scientific reason for not using Martin's eye colors. Since these are too far apart to be used for numerical determination of pigmentation, and the classification results in

very strong personal equations in making estimates of colors, I preferred to omit eye colors from the study. For skin colors exposure to air and light causes such large variations in the individual that these also were excluded.

At the same place he objects to my making copies of the valuable anthropometric records that have been kept in the Newark Academy, without describing the method of measurement in detail. He claims that I give the blank on page 34. It has not been reproduced in my report, neither on page 34 nor elsewhere. He repeats correctly that I intended to use these records for the sake of studying American families settled in this country for several generations and living under more favorable conditions. Since these have not been treated in any of the tables of my reports, there is no cause for criticism just yet.

2. Statistical Presentation of Results

I have already pointed out that the errors in calculation which Mr Radosavljevich believes to have found are miscalculations on his part. He also calls attention (pp. 416, 417, and repeated as something new on p. 423) to discrepancies in the numbers treated in Table IV, pp. 17–19 of my Partial Report, which refers to the measurements of length and width of head, width of face, and cephalic index of groups of Hebrews born more or less than ten years after the mother's immigration. This discrepancy is due to the fact that, after the classification for the cephalic index had been made, the cards were arranged for other purposes. Later, when I decided to calculate the values for the absolute measurements, the same classification of the material was made once more. Owing to the necessarily arbitrary classification of those born just ten years after the mother's immigration (see Abstract, p. 34; Final Report, pp. 110, 111), it was impossible to repeat exactly the same classification. Since the validity of a statistical result does not depend upon the fact that the series compared contain the same individuals, this does not affect the study, and I did not feel particularly called upon to explain the differences in numbers which are obvious, since they are all contained in the same table. Since

I adopted later on a more satisfactory method of determining the influence of time elapsed since the immigration of the mothers (Abstract, pp. 44–46; Final Report, pp. 67–69, 108, 111, 113, 115), a recasting of these tables for the final report seemed particularly unnecessary.

An error in the count of 9-year-old American-born Hebrew boys has been pointed out by me on page 102 of the Final Report.

The other discrepancies to which Mr Radosavljevich refers on page 422 are the following:

	Cephalic index	Length of head	Width of head
Table II, 1900–04, pp. 58–60	214 cases	213 cases	213 cases
Table II, 1890–94, pp. 62–64	162 "	161 "	163 "
Table III, 20 yrs. and over, pp. 68–72	764 "	763 "	763 "
Table IV, 14 yrs., pp. 78–82	24 "	24 "	23 "
Table IV, 18 yrs., pp. 78–82	65 "	66 "	67 "

In every one of these cases one observation has been thrown out for some valid reason, and it did not seem necessary to change the others because the result was not appreciably affected.

Mr Radosavljevich's difficulties in regard to the numbers measured (p. 421) would have disappeared if he had consulted the "Abstract," in which all the numbers of calculated observations are contained.

The numbers of Hebrews in the various series do not agree and can not agree (p. 421), because not all the necessary information for the varied statistical classifications can be obtained in every case, and cases without the necessary information naturally drop out of the particular series.

But to come to more important points. Mr Radosavljevich thinks that my considerations are based on "mere averages,—a method which has been condemned both in America and Europe," and, I may add, a condemnation to which I have added my liberal share. This question is intimately connected with the definition of what constitutes a biological type, and I must therefore say a few words on this trite topic.

Since all biological phenomena are variable phenomena, the biological type, i. e., all the individuals constituting a group, must be described by an enumeration of the frequencies of occurrence of all the variates constituting the type under discussion. The fact that anthropologists are in the habit of calling heads of a length-breadth index of 80 and more, brachycephalic heads, does not constitute brachycephaly a distinct biological type, but is a mere convenience of description. In the same way it is merely a convenience of description if we call a people a brachycephalic people in which the arithmetical mean of the head index falls in the group of brachycephaly, and in which also the majority of individuals are brachycephalic. The terms dolicho-, meso-, and brachy-cephaly have only a meaning as descriptive terms, not as biological types. Owing to this frequent misunderstanding and the erroneous opinion that these groups have really been proved to be distinct biological races, I have avoided for years these terms, notwithstanding their convenience, and speak only of more or less rounded, respectively, elongated heads. Mr Radosavljevich thinks that all the brachycephalic individuals in a certain people form a biological type, because the same conventional term is used to describe them, while in reality they are only a part of the whole series of variates of a type.

It will be understood that my remarks do not signify that there is no meaning in the distinct headforms which Retzius recognized with great acumen, thus laying the foundation of modern anthropology. The essential points are: that the arbitrary limits of the indices of 75 and 80 were invented only to classify conveniently the heterogeneous material; that the distribution of head indices in a people is a most important means of describing its characteristics; and that the fact that some individuals have an index lower than 80 and others higher than 80 does not prove that we are dealing with a mixed type. I shall speak of the question of mixed types later on, when discussing Professor Sergi's views (pp. 558 et seq.).

Bearing in mind the definition of a type, which is purely descriptive and contains no theory in regard to its homogeneous or multiple origin, we may apply what has been said above, that the

exact description of a type requires the statement of the exact relative frequency of occurrence of every form that belongs to the type; or, in case of a measurement, the accurate statement of the relative frequency of every measurement.

With the short series at our disposal this exact description is impossible to attain, for a determination of the exact distribution of frequencies would require for each series numbers of cases so large that ordinarily they do not exist in nature. The mean square error of a relative frequency p is

$$\epsilon = \pm \sqrt{p(1-p)/n}$$

If we find, for instance, that in adult foreign-born Hebrew males the cephalic index of 82 occurs 113 times among 764 individuals, or with a relative frequency of $113/764 = 0.148$, the mean square error will be

$$\epsilon_1 = \pm \frac{\sqrt{0.148 \times 0.852}}{\sqrt{n}} = \pm \frac{0.355}{\sqrt{n}}$$

Thus there would be left an error in a total series of

100	observations,	of 0.0355,	or about	24 %
900	"	" 0.0118,	" "	8 %
10,000	"	" 0.0035,	" "	2.4 %
40,000	"	" 0.0018,	" "	1.2 %
60,000	"	" 0.0015,	" "	1.0 %

For probabilities near 0.5 the result is a little more favorable, but distributions consist throughout of small probabilities for the value of each measurement.

These data show that an exact knowledge of the distribution of frequencies is practically impossible. If, however, a distribution exists which is characteristic of a certain type, then it is clear that each value which depends in a definite manner upon the distribution has a constant value. Since there is no reason for considering one observation as more valuable than another, it seems convenient to determine a value into which all observations enter in the same manner. Such a value is the average, or arithmetical mean. According to what has been said, the arithmetical mean has only one value for each type of distribution, so that it is impossible that

two series should be identical that have different averages. If the mean square variability σ of the series of n observations is determined, then the mean square error of the average is $\epsilon = \pm \sigma/\sqrt{n}$.

In the series of cephalic indices of adult foreign-born Hebrew males we find the average

$$a = 83.0$$
$$\sigma = \pm 3.2$$
$$n = 764$$

The error of a is therefore

$$\epsilon = \pm 3.2/\sqrt{764} = \pm 3.2/28 = \pm 0.11$$

According to the theory of probabilities (as has been stated on p. 537) we may bet in the following way that the true average is between the limits mentioned:

68	against	32	that it is	between	82.89	and	83.11
95	"	5	" " "	"	82.78	"	83.22
99.5	"	0.5	" " "	"	82.67	"	83.33

It is therefore quite easy to mark the limits which determine that the difference between two averages is significant. If the difference between two averages is significant, the two series cannot possibly be the same. The average is therefore the first criterion for distinguishing two series. This is a purely arithmetical procedure and has nothing whatever to do with the interpretation of the average, which is not involved in the process.

Mr Radosavljevich's opinion that the change of an average does not imply a change of type is therefore fundamentally wrong. The reverse is the basis of all anthropometrical work.

Besides the average, the mean square variation σ fulfils the condition mentioned before, namely, that all observations are considered in the same manner. This value has been defined before (p. 537). The accuracy of this measure is determined by the error

$$\pm \sigma/\sqrt{2n}$$

The theory of probabilities shows that in series which are dependent on many accidental causes only, the two values a and σ, i. e., average and variability, give us the theoretical distribution of an infinitely long series. For instance, the value of

$$a = 83.6 \qquad \sigma = \pm 2.8 \qquad n = 895$$

for the cephalic index of foreign-born Hebrew women (Partial Report, p. 82) gives us the following theoretical and observed frequencies (in per cent) of indices under 80, between 80 and 85, and over 85.

	Observed	Theoretical	Error
< 80	6.7%	7.2%	± 0.8
80–85	55.5%	56.1%	± 1.7
> 85	38.3%	37.2%	± 1.6

For the cephalic index of foreign-born Hebrew men (Partial Report, p. 72) we find

	Observed	Theoretical	Error
< 80	12.8%	13.6%	± 1.2
80–85	57.8%	55.4%	± 1.8
> 85	30.4%	31.0%	± 1.6

It will be noticed that these deviations are quite within the limits of errors that may be expected. The average and variability are thus seen to be not only in most cases an adequate expression of the whole distribution, but that they also give at a single glance a clearer impression of the character of the series than does the inconvenient tabular statement of the observed frequencies. It is entirely unjustifiable, as has already been stated, to assume that part of the series which lies under and over the arbitrary points 80 and 85 to represent distinct types.

I will discuss at this place the objection raised by Mr Hans Fehlinger[1] who claims that the total number of observations on which my results are based is inadequate. This I do not admit, since the summary table on page 56 of the Final Report (Abstract, p. 28), which has been drawn up for the purpose, shows that in most cases the differences between the foreign-born and American-born series are considerably larger than their mean square errors. The mean square error of the difference between two measures that have the individual errors $\sigma/\sqrt{n_1}$ and $\sigma/\sqrt{n_2}$ is $\sigma\sqrt{1/n_1 + 1/n_2}$, and their weight—corresponding to the number of observations—therefore

$$\frac{n_1 n_2}{n_1 + n_2}$$

[1] *Politisch-Anthropologische Revue*, Nov. 1911, X, no. 8, pp. 416–418.

By using this formula, the weights in the table referred to have been obtained, and we find the following approximate errors for the differences contained in the table:

	LENGTH OF HEAD	WIDTH OF HEAD	CEPHALIC INDEX	WIDTH OF FACE
Bohemians, Poles, Hungarians, and Slovacs				
Male	− 0.6 ± 0.4	− 1.8 ± 0.3	− 0.8 ± 0.2	− 1.6 ± 0.4
Female	− 0.4 ± 0.4	− 1.4 ± 0.3	− 0.7 ± 0.2	− 1.7 ± 0.4
Hebrews				
Male	+ 2.2 ± 0.24	− 1.8 ± 0.20	− 2.0 ± 0.12	− 1.1 ± 0.20
Female	+ 1.9 ± 0.37	− 2.0 ± 0.31	− 2.0 ± 0.19	− *1.3* ± 0.35
Sicilians				
Male	− 2.4 ± 0.43	+ 0.7 ± 0.35	+ 1.3 ± 0.21	− *1.2* ± 0.35
Female	− 3.0 ± 0.50	+ 0.8 ± 0.42	+ 1.8 ± 0.25	− 2.0 ± 0.42
Neapolitans				
Male	− 0.9 ± 0.4	+ 0.9 ± 0.35	+ 0.9 ± 0.20	− *1.2* ± 0.35
Female	− *1.7* ± 0.55	+ 1.0 ± 0.46	+ 1.4 ± 0.28	− 0.6 ± 0.46

All the values for which the probability of the result is more than 99,997 chances out of 100,000 have been printed in heavy type, those for which the probability is less than this amount, but more than 9,986 in 10,000, have been printed in italics. All these are, therefore, practically certain. The remainder might be considered as doubtful. Thus it will be seen that the length of head of the Bohemians and width of head of the Italians are the only doubtful measures. Length of head and width of face of Neapolitans appear also as certain when the measurements for males and females are combined.

Mr Fehlinger's claim that measurements of stature and head-form—which, he says, are exceedingly variable in almost all human types—lead more easily to errors than other measurements, I fail to understand. His statement that the individuals investigated are not of pure descent, but in part are children of parents of mixed nationality, is based on a misunderstanding of my work.

On the other hand, it might perhaps have been said that a psychological cause existed in the minds of the observers, which produced one personal equation for foreign-born and another for American-born. It is well known that an expected result may influence an observation. I think, however, the study of the

personal equations disproves this assumption. Besides this, the results among various types lie in different directions; the observers did not know what to expect; in many cases the statistical information was recorded by one observer, the measurements by another; and constant changes between foreign-born and American-born occurred in practice. All these make such a psychological explanation highly improbable. Here it must be considered as particularly important that the results agree with the previous observations by Ammon in Baden and Livi in Italy, which are, therefore, corroborative evidence of the accuracy of the results.

Here I must mention also the objection made by Sergi,[1] who considers the comparisons between parents and their own children as inadmissible on account of the small number of cases. He makes a rough comparison of the various series, merely counting the number of series of children of various ages in which the difference between parents and their American-born children exceeds that between parents and their foreign-born children, and vice versa. This is an inadmissible way of making the comparison. I have given these differences for Hebrew parents and children of all combined ages on page 124, and repeat here the results with their mean square errors.

Length of head	-1.65 ± 0.26
Width of head	$+1.52 \pm 0.20$
Cephalic index	-1.60 ± 0.12
Width of face	$+2.10 \pm 0.20$

It appears from this that these differences are also quite certain, their value being, in the case of the cephalic index, about twelve times that of its error. The probability that the differences in the two groups are due to chance, not to a definite cause, is infinitesimally small.

The differences in cephalic index between parents and their own American-born children, born less than ten years after arrival of the mother, and of those born more than ten years after the arrival of the mother, are, according to Table 18 (Partial Report,

[1] Il preteso mutamento nelle forme fisiche dei discendenti degl' inmigrati in America, *Rivista Italiana di Sociologia*, anno XVI, fasc. 1, Jan.–Feb. 1912, pp. 16–24.

p. 49, Final Report, p. 127) and the summary table 45, 2b (Final Report, p. 124), − 1.37 and − 1.97 respectively. Their difference is, therefore, 0.60, with a weight, according to Table 18 just quoted, of 200. This gives an error of $\pm 3.2/\sqrt{200}$ or about ± 0.22, so that the significance of this difference is also quite probable.

Mr Radosavljevich is not at all clear in regard to the question whether the differences can be considered as significant or not. He says (p. 419): "Even the differences which Boas found between parents and their children are normal differences in degree, which may be the result of the countless errors in such delicate measurements, and other causes" (I presume by "normal" he means here accidental), and (pp. 417–418): "We believe that these" (he refers to the table of cephalic indices of individuals that have been born more or less than 10 years after the immigration of their mothers, discussed on pp. 540–1 of this paper) "and other methodological errors may be just the cause of the differences, and not the American soil and financial panics. Even by those minute deviations from the average it cannot be certainly inferred that the greater variation of the figures means that the Hebrew or Sicilian is undergoing a modification of the shape of the head on American soil." I have just given the proof that the differences cannot be explained by accident, and that inadmissible inaccuracies of measurement do not exist.

Another question raised by Mr Radosavljevich relates to the uneven distribution of types. He claims that in all anthropometrical investigations the numbers of observations must be made equal for all the groups compared. This is wrong. In every statistical phenomenon there is a natural relative frequency of classes which must be guarded if we are to attain results of value. This is true particularly during the period of growth, when according to the system of obtaining material a certain selection takes place. The ideal of measuring all the children is unattainable. In grammar schools, for instance in the fourteenth year, those who go to work and those who are already in high school are not measured. When measuring high-school pupils an entirely different group is taken, which is, on the whole, better developed than the pupils of the

grammar school. At the same time, American-born pupils are more numerous in the high school, so that the difference between the two groups of American-born and foreign-born would be accentuated by mixing the two groups. Evening clubs represent, again, a different population. By filling up gaps, therefore, exceedingly complicated elements are introduced. I mention the particular case of the 14-year-old children because it gave me considerable trouble in the initial stages of the investigation. I am even in doubt if in my series the school children and children measured at home are strictly comparable, and this was additional reason for giving up measurements in schools. By the way, Mr Radosavljevich is mistaken if he thinks that the material was collected almost entirely in schools. No girls to speak of were measured in schools, and the total number of school children measured does not exceed three thousand. The irregular distribution is, therefore, one of the concomitants of a naturally selected series.

I must mention here another misconception of Mr Radosavljevich which Professor Sergi seems to share. In speaking of the difference in distribution of head indices which he cannot explain away, Mr Radosavljevich says that differences in the distribution of headforms of American-born and foreign-born children exist, but that "*it is not known what the differences were in the parents of these two groups*" (p. 409). I have treated the possibility of such differences on pages 42–44 of my Partial Report. In order to overcome this possible objection, I have investigated on the one hand parents and their own children in order to obtain strictly homogeneous material; on the other hand I have compared immigrants of each year with American-born descendants of immigrants of the same year, a comparison which insures homogeneity of material.

As a matter of fact Mr Radosavljevich undoes the whole work of his criticism in saying, "The differences found by Boas, if they have any real meaning, may be regarded as the normal differences of separate groups, such as are frequently noticed in separate parts of the same people." My only problem is the ascertaining of the occurrence of such differences between separate parts of a people,

namely, immigrants and their American-born descendants. I presume Mr Radosavljevich's assurance that differences occur "normally" does not solve the problem of their occurrence?

3. Interpretation

It may be due to the rather wide attention that has been given to my investigation by the daily press and a number of magazines, and the exaggerations that are found in these articles, that some investigators believe that I have claimed to have discovered the origin of a new American type. Here I may call to witness the critical Mr Radosavljevich, who certainly would have discovered this claim in my report if it were there. In fact, nothing can be farther from my thought, and the precise expressions in my later reports are due to my anxiety to avoid the possibility of such a misunderstanding. In the Partial Report the word "American type" does not occur. All I say is this: "The east European Hebrew, who has a very round head, becomes more long-headed; the south Italian, who in Italy has an exceedingly long head, becomes more short-headed; so that both approach a uniform type in this country, so far as the roundness of the head is concerned" (p. 7). Later, at the end of the discussion of the values of the cephalic index, I say, "The diagram shows very clearly that the two races[1] in Europe are quite distinct, but that their descendants born in America are very much alike" (p. 9). I might have added again "as far as the roundness of the head is concerned." Since, however, the diagram refers to nothing else, and the remark appears in the further elaboration of the thesis quoted before, I omitted the restatement of this restriction. Again, on page 50 of the Partial Report, I say, "The effect of these changes is the development of a greater similarity of the descendants of Sicilians and Hebrews, one to the other," a statement which is strictly correct, since only the cephalic index is referred to, and not by any means identical with the claim that both develop into one human type. I may also point out that in a popular article by Mr Hendricks, published in

[1] The term "race" was here, as in other places, introduced by the Immigration Commission. I had used the term "type."

McClure's Magazine, the only one that I had a chance to revise, the term "American type" is carefully avoided. Furthermore, in 1909, while the investigation was in progress, I disclaimed explicitly the probability of the development of an American type.[1] I will state here once more, that all I believe that has been proved are changes in various directions and of limited extent; in how far these changes may be progressive or limited by hereditary racial form, remains to be seen (Abstract, p. 53; Final Report, p. 76).

Mr Radosavljevich's criticism of what he calls my interpretation is difficult to discuss, because it seems to me that he has failed to grasp the meaning of older researches which he thought it worth while to recapitulate in connection with our problem, while he has certainly not understood my report. He constantly confuses two entirely distinct problems: the physical characteristics of the immigrants who arrive in America (for instance on pp. 394, 395), and the relation between the bodily form of foreign-born immigrants and their American-born children. As stated before, the former question has a bearing upon the latter, but has been treated only in so far as it had to be eliminated as a possible source of error. I say (Partial Report, p. 30): "The important problem of the selection which takes place during the period of immigration, and which is indicated by the change of type of immigrants after the panics of 1893 and 1907 . . . has not been studied." Nevertheless, Mr Radosavljevich thinks this is the fundamental problem (p. 395).[2]

I fear that his summary of theories in regard to changes of the form of the head does not throw much light on the question. He distinguishes:

1. A mechanical-functional theory, according to which such elements as the use of the temporal muscles, premature synostosis of sutures, etc., influence the form of the skull.

[1] *Science*, n. s., vol. XXIX, no. 752, May 28, 1909, p. 843.

[2] At this place he calls attention to the fact that, according to my tables, after 1893 stature, length and width of head, and width of face—that is, all the absolute measurements—decreased; while the cephalic index—a ratio—increased. This he considers a contradiction of my statement; but on the same page Mr Radosavljevich quotes me correctly as saying that all the absolute measurements decreased. So what has the cephalic index to do with this question? Or does he consider it an absolute measurement?

2. The hereditary theory in the following three forms:

(*a*) The form of the head of each race has remained constant since very remote periods. In his imposing array of authorities Mr Radosavljevich has forgotten the most pronounced advocate of this theory, J. Kollmann.

(*b*) The shape of the head is inherited, but it does not assume its final shape until after birth, and it does not depend on the mixed parental value of the cephalic index.

Here two entirely disconnected points are joined, the former of which has nothing whatever to do with the question of heredity. I fail to see what the literature quoted has to do with the "theory" as here pronounced. The quotation of Ranke as disproving my own investigations on heredity does not relate at all to the point at issue,—namely, the question of mid-parental versus alternating inheritance,—since Ranke does not touch upon the similarity between parents and children at all, the question which I treated. On the other hand, he does not mention Pearson's criticism of my paper,[1] nor the whole literature on Galtonian inheritance, Mendelism, and alternating inheritance, which belongs here.

(*c*) The third "form of the hereditary theory claims that the *shape of the head* (or rather skull) *is inherited*, but heredity means not always absolute stability."

This, again, has nothing to do with the case, since it is merely a statement of the phenomenon of variability. Hrdlička, the only author he quotes, gives in the passage cited merely a somewhat lengthy statement pointing out the well-known fact that each individual has his own particular characteristics—hardly a theory of heredity.

3. The geographical-local theory.

Here he confuses again two entirely distinct phenomena: the phenomenon of local types which may be due to permanence of racial traits, and the unifying effects of environment.

In the whole enumeration the real questions at issue are almost entirely overlooked. These are based chiefly on the questions of (1) Hereditary influences, which include (*a*) the transmittal of acquired

[1] *Zeitschrift für Morphologie und Anthropologie*, 1904, VII, pp. 524–542.

characters, (*b*) Mendelism, versus mid-parental and alternating inheritance, (*c*) the stability of characters and the origin of sports; (2) Selection; (3) Environmental influences, such as climate, altitude, and other geographical features, and social environment. An analysis of the phenomena of the last class must always lead ultimately to functional changes which determine the observed modifications of form.

Against the characterization of "Boas' theory as environmental-economic" (p. 405), I protest as based on a hopeless muddle of two distinct problems that have no relation whatever, namely, that of selection of immigrants according to economic conditions, and that of the changes in bodily form of the descendants of immigrants (see also above, pp. 535, 551).

To this confusion may also be attributed the criticism that my method of collecting data was not "*individualistic* but *collective* ('generalized,' *en masse*) in nature. This means that Boas did not study the effect of 'American soil' and 'financial panics' on the *same* individuals during a period of time representing the age of his subject (4 to 20 years 'and over') but he collected this data in a very short period, measuring a large number of immigrants" (p. 420). I should like to know how the effect of selection of immigrants in Europe can be studied individually; or how we are to trace the individual development of an American-born child in comparison with the same individual as a foreign-born child, for unless that can be done the method of following up the growth of each child does not help us to overcome the suspicion that there may be a different composition of the two series; and why quote all the observations on page 407 as significant if the generalizing method is not applicable? Mr Radosavljevich should at least be consistent and discard practically the whole anthropometry of growth, except some of my own and Dr Wissler's work. In the present case the individualistic method consists of a direct comparison of parents and their own children, and this I have used to the fullest extent.

I believe there is no need of occupying more space with a refutation of Mr Radosavljevich's criticisms. I shall be glad if "the

unexpected scientific results should be sifted by those who at least know the immense difficulties in attacking such complicated problems" (p. 405). Mr Radosavljevich does not know them.

I turn to the question of the interpretation of my observations and wish to repeat, first of all, my own conclusions. Starting from the observation that changes in the values of the averages occur at all ages, that these are found among individuals born almost immediately after the arrival of their mothers, and that they increase with the length of time elapsed between the arrival of the mother and the birth of the child, I have tried to investigate various causes that might bring about such a phenomenon. I have, as I believe, disproved the possibility that the difference between the two groups of American-born and foreign-born may be due to differences in their ancestry. This objection has been raised by Professor Sergi.[1] As mentioned before, the comparison of parents and their own children, and the comparison between immigrants who came to America in one particular year and the descendants who came to America in the same year, seem to me to eliminate entirely this source of error, which has been considered by me in detail.

Less satisfactory is the attempted proof of the theory that the cradling of infants has no influence upon their headform. The fact remains that among the Hebrews there is a radical difference in the bedding and swathing of infants born abroad and of those born here. Against this fact may be adduced the other one that no such radical difference in the treatment of children exists among the Sicilians, and that, nevertheless, changes occur and that these are in a direction opposite to those observed among the Hebrews. Even more unfavorable to this theory are the changes in width of face among Bohemians which develop among immigrating children who are no longer subject to such mechanical influences. I consider a further investigation into the influences of the method of bedding children desirable.

It also occurred to me that illegitimate births of children whose fathers were Americans might bring about changes. I have

[1] Loc. cit., largely reprinted by Radosavljevich in *Science*, May 24, 1912, pp. 821–824.

disproved this assumption by proving that the degree of similarity between American-born children and their reputed fathers is as great as that between foreign-born children and their fathers (Abstract, p. 51; Final Report, pp. 154 et seq.). Besides this the social conditions of the Hebrew, Italian, and Bohemian colonies are not at all favorable to such an assumption. This point has been raised again by an anonymous English critic,[1] without, however, referring to my discussion of the question and the answer given by me.

After disposing of these points which would give the phenomenon an accidental character, without deep biological significance, I have taken up the biological problem itself, and first of all have called attention to the parallel observations by Ammon and Livi and suggested that the changes observed by them as occurring between urban and rural populations may be due to the same causes as those observed in the descendants of immigrants. If this be true, then Ammon's interpretation of the phenomenon as due to selection, and Livi's as due to the more varied descent of urban populations which makes them deviate from excessive values to more median values must be revised.

I have also referred to the possibility that the breaking of the more or less inbred lines of small European villages after arrival of the people in America and the consequent change in the line of descent may be a cause producing changes in type.

Finally, I have pointed out that the changes can be accounted for by a process of selection only, if an excessively complicated adjustment of cause and effect in regard to the correlation of mortality and bodily form were assumed—so intricate that the theory would become improbable on account of its complexity.

It will, therefore, be seen that my position is that I find myself unable to give an explanation of the phenomena, and that all I try to do is to prove that certain explanations are impossible. I think this position is not surprising, since what happens here happens in every purely statistical investigation. The resultant figures are merely descriptions of facts which in most cases cannot be discovered

[1] *Edinburgh Review*, CCXV, p. 374. Jan.–Apr. 1912.

by any other means. These observations, however, merely set us a biological problem that can be solved only by biological methods. No statistics alone will tell us what may be the disturbing elements in intra-uterine or later growth that results in changes of form. It may be that new statistical investigations in other types of environment may give us a grouping of these phenomena which suggests certain groups of causes, clues that can then be followed up by biological methods,—it is certainly asking too much to expect the solution of this problem from *one* series of observations. I at least am more inclined to ask for further material from other sources than to force a solution that must be speculative.

This defines my position toward the criticisms of Gaston Backman[1] and Giuseppe Sergi. The former claims that the explanations given by Ammon are adequate, and simply identifies my observations and his. He overlooks the all-important difference that I have compared parents and their own children, a method which introduces an entirely new point of view and practically disproves Ammon's claim that these changes are due to natural selection. I should like to say here that I have always considered Livi's theory as the most plausible explanation of the European observations, and still think that it must be a strong contributory cause, although it is not applicable to our series and for this reason can no longer be considered as explaining the whole phenomenon. Backman's views are, it seems, not in accord with the results of our inquiry. He states: "The causes underlying the alteration will then have to be sought in factors of selection that may be of the most divergent nature. When, nevertheless, Boas wants to maintain that he by his researches has proved the plasticity of human races, this conclusion seems to me to carry further than the facts in question will permit. It seems, on the contrary, to me to be quite plain that it is the change from country life to city life that has been the fact of real importance in the matter of the alterations which the descendants of the immigrants have undergone, and not the special American conditions. The point of weight must be sought in those conditions which the changes from country life to city life carry with

[1] *Ymer*, 1911, pp. 184–186.

them." I have shown that selection is extremely unlikely to bring about the results observed. That the essential causes may be the city conditions is possible, but not proven. I have not ventured to claim that I have discovered these causes. Besides, what would it help us if we assign the phenomena to city life, since the manner of its influence is as obscure as that of any other cause? I may quote here from my "Abstract" (p. 52), which Mr Backman reviews (also Final Report, p. 75). When speaking of the differences between urban and rural types, noted by Ammon and Livi, I say: "Our American observations show that there is also a direct influence at work" (in so far as the differences occur also between parents and their own children, in which case selection is highly improbable and mixture excluded). "Ammon's observations are in accord with those on our American city-born central Europeans; Livi's, with those on our American city-born Sicilians and Neapolitans. Parallel observations made in rural districts and in various climates in America, and others made in Europe, may solve the problem whether the changes that we have observed here are only those due to the change from rural life to urban life. From this point of view the slight changes among the Scotch are also most easily intelligible because among them there is no marked transition from one mode of life to another, most of those measured having been city-dwellers and skilled tradesmen in Scotland, and continuing the same life and occupations here."

As long, then, as we do not know the causes of the observed changes, we must speak of a plasticity (as opposed to permanence) of types, including in the term changes brought about by any cause whatever—by selection, by changes of prenatal or postnatal growth, or by changes in the hereditary constitution of the individual. It is quite arbitrary to restrict plasticity to the last-named cause, as Mr Backman seems to do. In order to avoid this impression I have used expressly the term "instability or plasticity of types" (Abstract, p. 53).

Prof. R. S. Steinmetz[1] suggests that the observed changes may

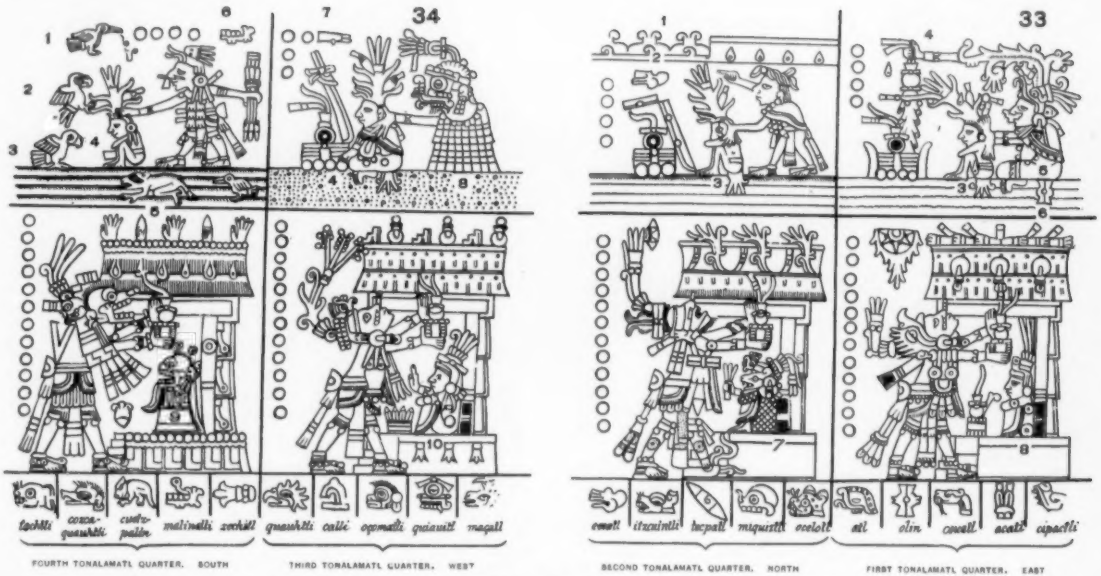
[1] Het nieuwe Menschenras in Amerika, *Nederl. Tijdschrift voor Geneeskunde*, 1911, pp. 342–352.

be due to the elimination of degenerate types that develop under the unfavorable European conditions and are, therefore, a reversion to the better developed old types. I do not consider this likely, because the conditions under which the immigrants live are not favorable; but this suggestion is worth following up as one of the possible contributory causes.

In personal conversation it has also been suggested that the lowering of the head index might be due to the increase in stature which occurs in America. I have myself pointed out that the cephalic index tends to decrease with increasing stature, because the correlation between all antero-posterior measurements,—in this case length of head and stature,—is closer than the correlation between these and transversal measurements. This relation, however, occurs only in a group which has been treated as a statistical unit. As soon as the groups are classified from distinct social or racial points of view, it ceases. This question has been treated by E. Tschepourkowsky.[1] It is clear that the same relation cannot be expected between stature and head measurements in a group which contains individuals of only one selected stature, as in a group in which all statures are increased owing to some cause that affects the whole group, and which may affect other measurements in peculiar ways.

Professor Sergi criticizes my views from the standpoint that he considers sudden changes in germplasm in new surroundings impossible and tries to reduce the phenomenon entirely to one of varying composition of the series, that is, if we follow his ideas out, to a differing fertility or mortality of component types of the immigrants. If his remarks, as it may seem, should indicate that he considers brachycephalic, mesocephalic, and dolichocephalic individuals as distinct types, the criticisms made before hold for his view also. His is an attempt to explain the phenomena by natural selection, the success of which, as said before, I consider as extremely doubtful. The particular form in which it is presented by Professor Sergi is based on his method of analyzing the somatological types constituting a people. I cannot consider his method as fruitful, since

[1] *Biometrika*, IV, pp. 286–312.



DEITIES OF THE FOUR QUARTERS. FROM THE CODEX FEJÉRVÁRY-MAYER

1. *Tzanatl*, Jackdaw. 2. *Alo*, Arara. 3. *Cocho*, Parrot. 4. *Toctli*, Maize plant. 5. *Quimichin*, Mouse. 6. *Malinalli*, Twisted. 7. *Mazatl*, Deer. 8. *Tlaloc*, Rain God. 9. *Mictlantecutli*, Lord of Hades. 10. *Cinteotl*, Maize God.

1. *Ilhuicatl*, Heaven. 2. *Eecatl*, Wind. 3. *Toctli*, Maize plant. 4. *Tlalocpanaliztli*, Outpouring of Water. 5. *Chalchiuhtli icue*, Water Goddess. 6. *Olin*, Motion. 7. *Tezcatlipoca itztlacoliuhqui*, God of Stone, of Punishment. 8. *Tonatiuh*, Sun God.

the analysis which he demands is impossible. If we establish a number of arbitrary types it is always possible to analyze a series of observations accordingly, but this analysis does not prove the correctness of our subjective classification and the existence of the selected forms as types, but is due merely to the fact that the distribution of observations *can* be made according to any fitting theory; but the correctness or incorrectness of the theory can be proved only in exceptional cases. I will give a definite example:

I can assume that the east European Hebrews, who have a variability of ± 3.2, consist of three elements, which have the characteristics that one element has a cephalic index ranging about 86, another one an index ranging about 83, and a third one an index ranging about 80. If, furthermore, I demand for each an equal variability, and assume that each series as well as the averages of the first four powers of the observed series follow the exponential law, the following composition results:

Variability of each series ± 2.7.

Number of cases of the series ranging about the index 83 four times the number of cases of series ranging about the indices 80 and 86 respectively.

The theoretical distributions for the homogeneous and compound series, and the observed series, for 764 cases, are given in the accompanying table. It will be seen that both series are so much alike that the one represents the observed series not appreciably better than the other.

If we analyze several series of this kind whose averages differ, making the assumption that they are composed of three equidistant elements of equal variability, the observed result can be obtained only by unequal frequencies of the constituting elements. If we call the variability of the observed series v, that of the component series σ, the distances between the averages of the component elements d, that between the observed average of the whole series and the middle component group d_0, and the number of occurrences of the series with smallest average n_1, of that with the middle

Cephalic Index	Theoretical Values: Homogeneous Series	Theoretical Values: Compound Series	Observed Values
71	—	—	3
72	—	—	—
73	1	1	—
74	2	1	1
75	4	4	2
76	9	8	9
77	17	16	13
78	28	26	28
79	45	44	42
80	61	61	57
81	77	80	77
82	89	94	113
83	98	95	99
84	89	94	76
85	77	80	77
86	61	61	67
87	45	44	41
88	28	26	21
89	17	16	22
90	9	8	7
91	4	4	7
92	2	1	1
93	1	1	1

average 1, of that with the highest average n_2, we can show, under the assumptions made before, that

$$n_1 + 1 + n_1 = 3(d^2 - d_0^2)/2(d^2 + d_0^2),$$
$$n_1 = \tfrac{1}{2}d\{(n_1 + n_1)(d - d_0) - d_0\},$$
$$v^2 - \sigma^2 = \tfrac{1}{3}(d^2 - 5d_0^2).$$

According to these formulas the composition of the series would change very rapidly with small changes of the average. For instance:

598 Bohemian foreign-born females have the average index 84.6 ± 3.2
211 Bohemian American-born females have the average index 84.3 ± 3.3

If the constituent elements of these series have the averages 81, 84, and 87, then the constituent elements would occur with the following frequencies per hundred:

SERIES	81	84	87	σ
Foreign-born	3	74	23	$\pm$ 2.8
American-born	11	68	21	$\pm$ 2.7

Such rapid changes in the composition of the series, due to very slight and therefore uncertain changes of the averages and the consequent asymmetries, do not seem at all plausible. It may also be pointed out that in the case here discussed the difference of the average must not be more than $\pm$ 0.72, in order to make the analysis possible.

In other words, if the theory of a compound origin of the series is to be maintained without other evidence than that contained in the distribution of observations in the series, it must be proved that the shifting of the average is associated with certain types of skewness. It may also be pointed out that in most cases in which the series can be proved to be compound, disturbances of the correlations between various measures will be found[1] that may corroborate or disprove the theory. In our series there are indications neither of significant asymmetries nor of disturbances of correlations.

It follows from all this that it is inadmissible to attempt an analysis on an arbitrary basis, unless proof can be given that the supposed constituent elements have biologically separate origin. The greater the number of types that are to be segregated, the more arbitrary becomes the method, and almost any analysis according to a sufficient number of types *can* be made. There are, of course, distributions that demand an analysis—like von Luschan's bi-modal curves of Asia Minor, or my own for width of face of half-blood Indians, and others,—but there must be strong internal evidence of a compound character, and even then the analysis will be arbitrary if the component types are not known. This is perfectly evident if we realize that each type must be defined by at least three constants,—average, variability, and relative frequency,—so that for two component elements five constants must be determined (one value of the relative frequencies being determined by the relative

[1] See F. Boas, The Cephalic Index, *American Anthropologist*, n. s., vol. 1, 1899, pp. 448–461.

frequency of the remaining series), for three elements eight, etc. The greater the number of constants to be determined, the better can the theoretical and observed series be made to coincide, almost regardless of the correctness of the theory which is expressed by the constants.

I conclude from this that the claim that the change must be explained by a different composition of the series of American-born is inadmissible, because it is an entirely arbitrary solution of the problem.

I repeat that I have no solution to offer, that I have only stated the results of my observations and considered the plausibilities of various explanations that suggest themselves, none of which were found satisfactory. Let us await further evidence before committing ourselves to theories that cannot be proven.

Finally, a few words on the opinion that has been expressed or implied, that our observations destroy the whole value of anthropometry, in particular that the study of the cephalic index has been shown to have no importance. It seems to me, on the contrary, that our investigations, like many other previous ones, have merely demonstrated that results of great value can be obtained by anthropometrical studies, and that the anthropometric method is a most important means of elucidating the early history of mankind and the effect of social and geographical environment upon man. The problem presented by the geographical distribution of headforms,—for instance, of the cephalic index,—has not been solved by our inquiry. All we have shown is that headforms may undergo certain changes in course of time, without change of descent. It seems to my mind that every result obtained by the use of anthropometric methods should strengthen our confidence in the possibility of putting them to good use for the advancement of anthropological science.

COLUMBIA UNIVERSITY
NEW YORK, *August 6, 1912*

PROCEEDINGS OF THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

Meeting of October 24, 1911

THE 455th regular meeting of the Society was held in the new building of the National Museum. The first paper read was by Mr James Mooney, on Indian Survivals in the Carolinas.

Mr Mooney gave a brief account of his summer's work with the Eastern Cherokee on their reservation in the mountains of western North Carolina, and with some mixed-blood survivors, locally known as Croatan Indians, in the eastern part of the State. The Eastern Cherokee, numbering about 2,000, are descendants of those who fled to the mountains when the body of the tribe was removed to the Indian Territory in 1838. They still retain most of their aboriginal customs and beliefs, together with their language, although the larger tribal ceremonies are nearly obsolete.

The Croatans, so-called from an attempt to identify them with Raleigh's lost colony of 1585, are centered chiefly in Robeson county, to the number of about 8,000 according to the last census, with bands in adjoining counties and in South Carolina. They appear to be descendants of the original native tribes of the same region, largely mixed with alien blood, the Indian blood still predominating, although they have completely lost all knowledge of Indian customs, language, and tribal names. They are intelligent and prosperous people, farmers and small tradesmen, fully up to the level of their white neighbors. They have official recognition from the State as Indians, with a separate school appropriation; they also support a small paper called *The Indian Observer*, devoted to their interests.

Mr F. W. Hodge gave an account of the archeological researches conducted in behalf of the Bureau of American Ethnology in conjunction with the School of American Archæology in a large ruin, known as Kwasteyukwa, on a mesa overlooking the Jemez valley in New Mexico. Certain of the pottery found shows relationship with that of Sikyatki, a prehistoric pueblo of the Hopi of Arizona. Intrusive objects also were found, indicating the comparatively modern occupancy of the village, which was built on the walls of an older pueblo.

Mr Hodge also exhibited a series of paper squeezes and a plaster cast of one of them, made during an expedition to El Morro, or Inscription Rock, in western New Mexico. This rocky prominence, on the ancient trail to Zuñi, was a camping-place of the early Spanish explorers and missionaries, many of whom inscribed their names and also the object of their visit. About twenty squeezes were made of inscriptions ranging in date from 1606 to the eighteenth century. These inscriptions shed much light on early Pueblo history.

Dr P. Radin spoke on Some Archeological Problems of the Winnebago. Dr Hrdlička suggested that the character of the skulls found in the Wisconsin mounds should be taken into consideration by the speaker.

Meeting of November 14, 1911

THE 456th regular meeting of the Society was held in the new building of the National Museum. The address of the evening was by Dr W J McGee, on Conditions Limiting the Growth of Population in the United States. Dr McGee's presentation was an elaboration of his paper in *Science* (October 6, 1911, pp. 428–435).

Meeting of January 16, 1912

THE 457th regular meeting of the Society was held in the new National Museum building. The speaker was Dr J. W. Fewkes, who lectured on The Western Neighbors of the Prehistoric Pueblos, illustrating his remarks with lantern slides. The early Spanish discoveries, he said, designated the habitations of the sedentary Indians of the Southwest by several names, as pueblos, casas grandes, rancherias, and trincheras, the word "pueblo" being especially applied to a compact several-storied community house of terraced form represented most abundantly along the Rio Grande in New Mexico. The large houses on the Gila they called "casas grandes," and they gave the name "rancherias" to an aggregation of fragile-walled dwellings made of brush and clay supported by ribs of wood. Defensive walls were called "trincheras". Each of these names indicates a distinct architectural type, although they were not used with accuracy. In late years all ruined buildings in the Southwest, especially those independent of cliffs, have been called pueblo ruins, the culture of the people that once inhabited them being designated the Pueblo culture. It is well to preserve the term pueblo for a group of the compact, terraced, many-storied buildings to which it was originally applied; this done, the distribution of the pueblo type in our Southwest is considerably

restricted. The stone ruins ascribed to the ancient sedentary inhabitants of Arizona from the upper Verde westward to the Colorado are not true pueblos. In this region there predominated great, massive, stone forts and fragile-walled houses with stone foundations, a duality everywhere evident. The indications are that both kinds of buildings were constructed and used at the same time and by the same people. The forts, situated on almost inaccessible hilltops, were places of refuge, while the less substantial buildings on the river terraces were habitations near aboriginal farms. The great number of these forts on the western border of the Pueblo region implies a necessity for defense along the entire western boundary of Arizona and Sonora.

Dr Fewkes gave a brief account of the different forts and terrace dwellings on the upper Gila and its tributaries, Sycamore and Granite creeks, the Chino and Williamson valleys, and Walnut creek to the mouth of the Santa Maria and other tributaries of the Colorado, all examples cited substantially agreeing in the duality of architectural type and the absence of true pueblo structure.

The simple construction of the forts and the rude character of the masonry, of undressed stone without mortar, was referred to. Views of the remains of rancherias on the river terraces were shown and described. Terrace sites indicated by rectangular and circular lines of stones and low mounds occur all along the Chino and Walnut valleys to Aztec Pass. These show no evidences of kivas, or sacred rooms, or of many-storied dwellings. The pottery found near them is rude, sometimes decorated; the pictography is characteristic; the people made extensive irrigation ditches.

The most important forts mentioned were those on the upper Verde, near Chino, and on the limestone ridge west of Jerome Junction. Two important forts (one situated near the mouth of Walnut creek and the other at Aztec Pass, the latter being the "pueblo" first described by Lieut. Wheeler) were referred to by the speaker. Big Burro creek and other streams west of Aztec Pass have forts overlooking enormous cañons of great scenic interest.

The geographical distribution of the forts in western Arizona corresponds generally with the northern extension of the Yuman stock, according to Powell's linguistic map. The country west of the Verde valley in which the ruins occur was peopled by Yavapai, Walapai, Havasupai, and other Indians called "Apaches" by José Cortez. The Havasupai, who now live in the depths of Cataract cañon, and the Walapai are said to have legends that their ancestors constructed some of the

buildings described. The Hopi dwelling in Oraibi pueblo claim that certain of their clans came from the west and that they are of Yuman stock. The question of the kinship of the ancient builders is of interest to the physical anthropologist as well as to the philologist and the student of culture-history. As Indians of the Yuman stock formerly extended to the Pacific, the possible kinship of the western neighbors of the Pueblos to tribes of southern California is significant.

Dr Aleš Hrdlička, in discussing the address, said that the results of the direct study of man himself in the region west of the Pueblo area agree in large part with the conclusions reached by Dr Fewkes, but in part they also differ. It is possible that the region about and west to southwest of Aztec Pass was once occupied by either the Mohave or the Yuma. The people against whom they had to defend themselves, however, were more probably the Apache. The Walapai and Havasupai, who today speak the Mohave language, are physically Apache, and the same is true of the Yavapai. As the Apache type is a very distinct one, this conclusion is quite definite. Both tribes contain, of course, some Mohave and probably also Pueblo admixture.

Dr Hrdlička showed a series of views of Havasupai and Walapai huts that are related to those of the Apache but which are totally distinct from those of the Mohave and the Yuma, and numerous types of men and women from the several tribes, showing great resemblance between the Walapai and Havasupai and the Apache, while the Mohave resemble the Pueblos much more closely.

Mr George R. Stetson addressed the Society on the Code of Hammurabi. His remarks showed how humanitarian the code was, and what an advance it was on Roman law in several respects, though antedating the latter by centuries. The speaker also demonstrated how the laws of various states of the Union and of certain foreign nations might well be advantageously amended on the lines of the code under discussion.

Meeting of February 6, 1912

THE 458th regular meeting of the Society was held at 4:45 o'clock in the new building of the National Museum. The speaker was Prof. Mitchell Carroll, secretary of the Archæological Institute of America, who delivered a lecture on The Excavations at Knossos. It was pointed out that Sir Arthur Evans' excavations in Crete since 1900 have added a new horizon to European civilization. The discoveries at Knossos, the capital of the Sea Empire of old King Minos, cover a period of more than two thousand years, embracing the third and second millenniums

before Christ, which is now known as the Minoan or Bronze Age of Crete, beginning with the end of the Stone Age with the introduction of bronze weapons and tools, and ending with the incoming of iron. Dr Evans divides this into nine Minoan periods, the last of which corresponds with the Mycenæan Age revealed through the discoveries of Dr Schliemann at Troy and Mycenæ.

Professor Carroll, with the aid of stereopticon views, described in detail the palace of Minos excavated by Dr Evans, and brought these discoveries into close relation with the legend of Theseus and the Minotaur, and the historical references to Crete in Thucydides and Herodotus, showing that it was the cradle of Greek civilization. The palace itself was the labyrinth, and the Minotaur was the Greek personification of the bull-grappling contests popular at the royal court, in which were sacrificed the youths and maidens brought as tribute from conquered states. Athens was at one time subject to Crete, and Theseus, one of its legendary kings, doubtless regained its liberty and started it on its eventful history.

Meeting of February 20, 1912

On February 20, at 8 o'clock, the retiring president, Dr J. W. Fewkes, delivered an address in the lecture hall of the new building of the National Museum, on Great Stone Monuments in History and Geography. Dr Fewkes' paper will be published in full in the *Smithsonian Miscellaneous Collections.*

Meeting of March 12, 1912

The 459th regular meeting of the Society was held in the new building of the National Museum at 4:45 P. M. Miss Frances Densmore read a paper on the Sun Dance of the Teton Sioux. Miss Densmore's study was conducted in a series of councils to which the old leaders of the tribe came from a radius of about a hundred miles. Fifteen reliable men were selected to give the account of the sun dance, their authority being established by interviews with about forty members of the tribe, in widely separated localities. Those who took part in the sun-dance councils were men who bore upon their bodies the scars of their participation in the sun-dance tortures, and among them were the man who acted as intercessor in the ceremony and the man who performed the cutting of those who fulfilled vows, both men being the only Tetons living who had thus officiated. The men comprising the sun-dance council, with Miss Densmore and an interpreter, visited the site of the last sun dance held by the Teton Sioux in 1882, the site being identified by the Indians. The

place where the sun-dance pole was erected, the outline of the "shade-house," and the location of the "sacred place" were recognized, and measurements showed them to be correct, according to the usual plot of the sun-dance grounds.

The sun dance was held annually by the Sioux and was distinctly a religious ceremony. The fulfilling of vows of torture was an important part of the ceremony, the vows having been made by men in danger on the warpath. When making the vow they asked for a safe return and that they might find the members of their family alive and well, and the fulfilment of the vow was required whether the prayer was granted or denied.

The paper was illustrated with songs of the sun dance which had been recorded by the phonograph and were played on the piano. Many of these were ceremonial songs and known only to the man who sang them for the lecturer. One of these men has died since the songs were recorded. A collection of old ceremonial articles used in the sun dance was exhibited.

Meeting of April 10, 1912

THE 460th regular meeting of the Society was held April 10, at 4:45 P. M., in the new building of the National Museum. The speaker of the afternoon was Dr Henri Pittier, the subject of whose address was Notes on the Native Tribes of Panamá, with all of whom he came in contact in the course of his travels.

There is much confusion current as to the number of the so-called tribes and the stocks to which they are related. The numerous names recorded correspond, in fact, not to distinct tribes, but merely to villages, names of chieftains, or, in a general way, to what the Spanish chroniclers designated as "parcialidades."

At the present time there are east of the Canal Zone only two distinct "nations," viz., the Cunas, or Cuna-Cuna, to which the San Blas Indians belong, and the Chocoes to the south, beyond the Tuyra river. The line that separates these two stocks is at the same time the ethnological boundary between South America and Central America.

The Cunas are a numerous and strong people, almost uniformly of short stature and broad-shouldered. They are very jealous of their independence, and shun all interference on the part of strangers, including the Panamanian government, the authority of which over them is only nominal. The Cunas of the northern coast, east of Nombre de Dios, or San Blas Indians, are far above the other Panamanian aborigines in their social and economic development; they constitute one of the best elements

of the population included in the territory of the young republic, being thrifty and enterprising and having made of their extensive cocoanut palm plantations a real source of wealth. The remaining Cunas, known as Bayanos, Chucunacas, and Payas, live in the interior and are less advanced, the former two groups being acknowledged as real "Indios bravos." All speak one language, with slight local variations.

The Panamanian Chocoes are the northernmost branch of a numerous stock which extends more or less continuously along the Pacific coast of South America, from Punta Grachine in Darien to the Ecuadorian boundary. In the Sambú valley, where Dr Pittier found them, they are a happy lot, usually tall and well built, scantily clothed, and living quite near to nature.

West of the Canal Zone, in the mountains of Veraguas and in eastern Chiriqui, live the polygamous Guaymies, once under the care of the Spanish missionaries, but who have long since reverted to their own independent life and customs. They do not, however, avoid or repel contact with the other natives, and owing to the rapid expansion of the neighboring populations, so-called civilized, the Guaymies are doomed to lose their characteristics and individuality as a race. Certain ethnological traits, as well as their physical appearance, point to a relationship with Costa Rican tribes.

In consequence of what Dr Pittier calls a "caprice of arbitration," the Republic of Panamá has acquired the northern branch of the Térrabas, or Tirúb, of Costa Rica. These dwell in small and rapidly dwindling numbers at the headwaters of the Teraria, or Tiloria, the main branch of the Changuinola river. They have been investigated by Pittier in the course of his survey of Costa Rica.

These four are the tribes represented today in Panamá. The Dorasques, supposed by some to descend from the great Chiriqui potterymakers, seem to have disappeared, unless the Brunka of Costa Rica are really what is left of them.

With reference to the possible affinities of the Panamanian tribes with the neighboring stocks, the speaker took absolute exception to the theory of the Chibchan relationship, which he was one of the first to advocate about twenty years ago and which has since received general acceptance under the authority of Brinton, Deniker, and others. The pretended relationship is founded merely on linguistic analogies and on the apparently common origin of a number of words. But these facts can be taken as conclusive only if supported by common anthropological characteristics and also by partial community of uses and customs.

Physically, the Cunas are strikingly distinct from the Guaymies and the Costa Rican Indians, and both stocks offer none but general racial likeness with what is left of the original Chibchas.

In the opinion of Dr Pittier the origin of the Cuna-Cuna must be sought elsewhere than in the interior of Colombia; and the Guaymies, Valientes, Bribri, Térrabas, Sumos, etc., are more likely to be the remnants of a primitive autochtonous stock.

Dr Pittier's address was illustrated with numerous lantern-slides and the exhibition of the objects collected among the Chocoes and Guaymies.

Meeting of April 30, 1912

THE 461st regular and 33d annual meeting of the Society was held on April 30, at 8 P. M., in the new National Museum building, with the president, Mr F. W. Hodge, in the chair. The following officers were elected:

President—Mr G. R. Stetson.

Vice-president—Mr Francis LaFlesche.

Secretary—Mr William H. Babcock.

Treasurer—Mr J. N. B. Hewitt.

Additional Members of the Board of Managers—Messrs G. C. Maynard, Felix Neumann, E. T. Williams, Drs E. L. Morgan and John R. Swanton.

The following amendments to the by-laws were adopted:

Art. I., Sec. 1, to read: ". . . Its members shall be classed as Active, Life, Associate, Corresponding, and Honorary."

Art. I., Sec. 2, for the words "This sum . . . January" the following to be substituted: "Members elected at any time during the first half of the calendar year shall pay the full amount of their annual dues; those elected during the last half of the year shall pay one-half the regular annual dues."

Art. I., Sec. 3, to read: "Associate Members are those who, after having been elected, shall have paid the annual fee. The annual dues for Associate Members shall be Two Dollars ($2.00) for each calendar year, payable in January. This sum entitles them to all rights and privileges of the Society with the exception of the *American Anthropologist*."

Old sections, 3, 4, 5, 6, 7, to read 4, 5, 6, 7, 8.

Art. I., Sec. 5 (formerly Sec. 4), "Proceedings" to be substituted for "Transactions"; "or associate" to be inserted after "active"; "those classes" to be substituted for "that class."

Art. I., Sec. 6 (formerly Sec. 5), for "Transactions," read "Proceedings."

Art. II., Sec. 4, for "quarterly" read "annual"; for "transactions" read "proceedings."

Art. III., Sec. 1, for "alternate Tuesdays" read "third Tuesdays of each month."

Art. III., Sec. 3, after the words "Board of Managers" insert "the President."

Art. III., Sec. 4, after "President" insert "or at the recommendation of three members of the Board."

Art. VI., Sec. 1, to read: "These by-laws may be amended by a three-fourths vote of the Active, Associate, and Life Members present at any officially appointed meeting of the Society, provided notice of the proposed amendment shall have been given, in writing, at a meeting held not less than sixty days previously."

TRUMAN MICHELSON,
Retiring Secretary

DISCUSSION AND CORRESPONDENCE

AN INGENIOUS METHOD OF CAUSING DEATH EMPLOYED BY THE OBEAH MEN OF THE WEST INDIES

THE great power which the so-called *obeah* men hold over the lower classes of the colored residents of the West Indian islands, even in some of the most highly educated and Christianized communities, is well known to those who understand these people; but among those who regard them merely as negligible "niggers" to be despised, or as just the same mentally and physically (except for the minor detail of skin pigmentation) as the white-skin races, the existence of this power is, unfortunately, usually regarded as visionary, for the colored people are supposed either to be altogether too stupid to exercise it or too highly Christianized and too thoroughly civilized to stoop to such methods to enforce their will, though almost all such well-meaning but misguided individuals admit its persistence, to a greater or lesser degree, in certain communities remote from the elevating influence of the white race.

Like all peoples who live chiefly out of doors, the colored West Indians have a close acquaintance with many of the mysteries of nature which, while not nearly so intimate as that of many other races, is still intimate enough for all the ordinary purposes of life.

Long ago the obeah man of the more progressive communities saw the danger of resorting to the mineral poisons or to the vegetable alkaloids in casting his spells over those whom he desired to remove, and, therefore, in order to retain his power, which of necessity is based on the ability to cause death, was forced to seek some means whereby the same result could be attained without the danger of readily recognizable symptoms coming under the eye of a well-trained medical man. He therefore turned from the mineral and vegetable worlds to the animal, and worked out a method which reflects the highest credit upon his ingenuity, for, while it accomplishes the desired end, it does it in such a way that the doctor is unable to detect in the death of the victim a case of murder, and if his suspicions should by chance be aroused he is equally unable, by legal means, to adduce evidence of such a character as would justify a conviction before a magistrate.

The method of the obeah man is very simple. Securing an ordinary

quart bottle, he fills it about half-full of chopped liver—human liver if he can get it, on account of its enhanced moral effect, though any liver will do. This he places in some warm, moist spot and leaves for a few days. The liver decomposes and attracts numerous blow-flies which lay their eggs in it. The bottle is then removed, stoppered, and put away until the flies begin to hatch out.

Now, the colored people, no matter how thoroughly educated they may be, are desperately afraid of "jumbies," or ghosts with peculiarly vicious dispositions, which have a wide range throughout the West Indian region and are of very frequent occurrence. At night, to keep these frightful monsters out of their houses, they close all the windows and doors and stop up all the cracks with wadding; it must be understood that the "jumbie" differs generically from the ghost of most other races in having, though amœba-like and capable of assuming all conceivable shapes, a certain amount of indefinite substance so that it cannot pass through a solid wall. To make doubly sure, the people sleep naked, when the weather permits, as it usually does, except for a cloth over their heads, for "jumbies" always catch sleeping persons by the head, and therefore if this be covered they are, with the other precautions taken into consideration, reasonably safe.

When the obeah man's bottle is swarming with adult flies, which have been crawling about over the surface of the decomposed liver, he takes it to the house of the person over whom he has cast his spell, pulls out a bit of wadding from a crack, inserts the neck of the bottle, and shakes it, whereupon the flies work their way out into the room. The obeah man then replaces the wadding, throws the bottle where it cannot be found, and goes home. It should perhaps be mentioned that the obeah man is fairly safe from detection on his nocturnal wanderings, as usually he is the only person in the community not afraid to venture out after dark. If any others are abroad he can readily keep out of their way, as, seeking safety in numbers and noise, they will be in bands of various sizes singing or shouting to keep their courage up and to keep the "jumbies" at a distance.

The flies which have escaped from the obeah man's bottle into the room of his victim naturally collect on the warmest object in the room, which is, of course, the sleeping man. Now, laborers are rarely entirely free from cuts, abrasions, or sores, and these are soon discovered by the flies, which walk back and forth across them. The result is almost certain infection, which, at first not regarded as serious, or at least not serious enough to warrant calling upon the more or less distrusted doctor,

spreads rapidly and the man soon dies in a characteristic way which, in some communities at least, everyone knows to be the result of the obeah man's mysterious but potent charm.

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THE ROOT KOMPAU: ITS FORMS AND MEANING

THE *Natick Dictionary* was evidently compiled by Dr Trumbull at an early period of his Algonquian studies, and contains, on nearly every page, numerous errors, many of them very serious, and some of which were, as opportunity offered, corrected in subsequent writings, and especially in the able papers which he published in later years. Among such errors are the statements made on page 327 on regard to the verbal root *kompau* and its meaning, referred to by Dr Michelson in the *American Anthropologist* (N. S., vol. XIII, p. 339).

This element of Algonquian synthesis, which would now be written *ka^{n}päw*, and is a root of secondary order, does not mean 'he stands erect,' nor does it, as Trumbull intimates, contain the word *-omp* (*a^{n}p*), 'man,' any more than does *ahtomp* (*a'ta^{n}p*), 'bow', for which the compiler, on page 104, suggests the meaning of 'that which belongs to a man'. The root is found in forms that vary but very slightly in all the dialects of the eight or nine linguistic groups into which the Algonquian language is divided, except, perhaps, in Micmac, a dialect so aberrant as to constitute a group by itself. Some of these forms are as follows: Cree (Prairie) *-kābäw*, Abnaki (Kenebek) *-ga^{n}bäw*, Lenape *-gāpäw*, Ojibwe (St Mary's) *-gābäw*, Nipissing *-kāpäw*, Massachuset *-ka^{n}päw*, Narraganset (Cowesit) *-ka^{n}päw*, Wea *-kāpäw*, Fox *-gābäw*.[1] The characteristic or final letter of this root is *w*, for which Eliot, as in other cases, substitutes its vocalic relative *u* (oo). The personal suffixes employed to form an intransitive verb consisting of this root and a prefixed modifying word are most perfectly preserved in Cree, in which in the singular of the indicative present they are in the 1st and 2d persons *-in*, and in the third *-iw*, which in Abnaki and Lenape are reduced to *-i* in the 1st and 2d persons and to *u* or *o* (for *-iu* or *-io*) in the 3d, and which in Ojibwe and Nipissing have vanished in the 1st and 2d persons, and have shrunk to *i* in the 3d. In all other dialects, eastern and western, they have completely disappeared,

[1] The Fox form given by Dr Jones, and written by him also, perhaps inadvertently, *-gāpā-*, is extremely remarkable, since it is very unusual to find in an Algonquian dissyllabic root a long vowel substituted in one of the syllables for a short one, or vice versa.

and left the duty of denoting the persons to be assumed alone by personal pronouns that either stand before the verb or are permanently prefixed to it; but evidence of their former existence in Narraganset, Massachuset, Ojibwe, and Nipissing is preserved in the participial endings *-i-yān*, *-i-yăn*, *-i-t*, and doubtless also in Fox and closely related western dialects, in which the suffixes of the present indicative must formerly have been *-i^{e}*, *-i^{a}*, and *-iw^{e}*.[1]

The root under consideration is, in verb form, translatable into English by a tense of the verb 'to stand,' in a somewhat vague sense, the attitude, whether upright, aslant, sideways, bent backward, or forward, etc., having in all cases necessarily to be denoted by a prefixed adverb or an adjective, preposition, or root used adverbially, since no meaning except 'stand' is inherent in the root;[2] as Cree *sīmātchīkābāwiw*, 'he stands upright' (where *sīmātch* is the adverb, from root *sīmāt*, 'perpendicular,' 'vertical,' *kābāw* is the root, and *-iw* is the suffix of the 3d pers. sing. that turns the combination into a verb or sentence-word); Abnaki *nāwāsĭga^{n}bāwu*, 'he stands bent forward' (stooping); Nipissing *shāshăgkāpāwi*, 'he stands bent backward' (haughtily); Narraganset *pānĭka^{n}pāw*, 'he stands sideways'; Abnaki *nāwāskwéga^{n}bāwu*, 'he stands with bowed head'; Nipissing *o^{n}bĭkwékāpāwi*, 'he stands with head erect'; Ojibwe *ānĭmĭgābāwi*, 'he stands with back turned' (toward somebody);[3] Nipissing *ĭshpĭkāpāwi*, 'he stands high' (has long legs); Lenape *ĕtshīgāpāwu*, 'he stands between' (mediates); Fox *nĕmäswigāpāw^{e}*, 'he stands upright.'[4]

[1] It may be stated here that the faint vowel sounds (mostly *a* and *i*) in which words belonging to the Fox, Kickapoo, and other dialects of the Osaki-Shawnee group, and to the Peoria, Miami, Piankashaw, and other dialects of the Illinois group terminate, have, in many cases, no morphologic value, but simply represent peculiarities of pronunciation and are not heard in the dialects of any of the other linguistic groups of the Algonquian language.

[2] Hence Baraga's *nin gābaw*, 'I stand,' given on page 243 of Part I of his *Otchipwe Dictionary*, and referred to by Dr Michelson, is incorrect, since *-gābaw* is an incomplete word, and cannot, *per se*, be employed to mean anything; while *nin nĭbâw*, 'I stand' (on same page), is correct because *nibâw* is a word complete in itself, from a primordial root in which the meaning of 'stand' is inherent and incapable of modification.

[3] Baraga (II, 37) writes this verb *animikogabawi*, which means 'he stands on his belly,' or 'with his face to the ground'; the error being due to the use of the root *ănĭmĭko* instead of the root *ănĭmi*.

[4] Given by Dr Jones on page 801 of *Algonquian* (*Fox*), with the very free interpretation of 'he rose to his feet'. On the following page are given two miswritten words, from the same root, in what the author calls elsewhere the "conjunctive mode," a name over which Cuoq's more appropriate term "eventual mode" has forty-odd years' priority, and over which Belcourt's name of "contingent mode" has also many years' priority; while conjunctive is an occasionally used synonym

The manner in which the standing is done, the prolongation or cessation of the act, and the physical or mental state or condition of the subject is designated in the same way, that is to say, adverbially, as: Nipissing *tchisīkāpāwi*, 'he stands on his toes'; Ojibwe *pītĭgwésigābāwi*, 'he stands on his heels'; Cree *nāpātékātekābāwiw*, 'he stands on the leg of one side only'; Ojibwe *otchĭtchĭngwänĭgābāwi*, 'he stands on his knees'; Abnaki *saⁿgrégaⁿbāwu*, 'he stands firm'; Cree *nĕstukābāwiw*, 'he is tired of standing'; Cree *peyākokābāwiw*, 'he stands alone' (all one); Ojibwe *dägogābāwi*, 'he stands among others'; Abnaki *aⁿrāwĭgaⁿbāwu*, 'he is unable to stand'; Abnaki *pĕnĕtsaⁿgaⁿbāwu*, 'he stands a long time'; Ojibwe *nogĭgābāwi*, 'he ceases to stand'.

It appears that such verbs can, in Abnaki at least, take on a reflexive form when occasion requires, as: Abnaki *äsaⁿgaⁿbāwiĕsu*, 'he withdraws himself, standing', which is better expressed by French 'il se retire, étant debout'. Negative form *äsaⁿgaⁿbāwiĕsiwi*.

The root under consideration, with its verbal suffixes, is sometimes mentioned by grammarians as a verbal "termination". But this is true only in the case of intransitive verbs. A verb formed from it takes an initial position in a sentence-word consisting of a transitive verb, and this gives the so-called "termination" a central position, as: Abnaki *ätsĭlégwäkégaⁿbāwu*, 'he stands on his knees' (kneels); transitively, with indirect object in the dative, *ätsĭlégwäkégaⁿbāwiläwaⁿr*, 'he stands on his knees to him'; causatively, *ätsĭlégwäkégaⁿbāwiläwaⁿhäraⁿr*, 'he makes him stand on his knees to him'. It was in alluding to their custom of expressing ideas in what a foreign writer styles "compounds of direful length" that Eliot, in *The Indian Grammar Begun* (1666), said of the natives:

> "It seems their ideas are slow, but strong,
> Because they be utter'd double-breath'd and long."

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for subjunctive or suppositive, a mood which represents something under a doubt, wish, condition, supposition, etc., which the eventual mode does not. Of the words above alluded to I shall mention but one, viz., *tcāgänʌgigāpāwātc*^{i}, which needs the letters *w* and *i* between *gāpā* and *wātc*^{i} to give it a semblance of meaning, and should be written (in the author's orthography, of course) *tcāg änʌgigāpāwiwātc*^{i}. I shall say nothing of the impropriety of prefixing the root *tcāg* to an already completed word, nor of the curious derived meaning of 'all', 'entirely', that this radical (which is common to Cree, Ojibwe, and Nipissing, and which gives an idea of consumption or exhaustion, of something all gone, all spent, entirely used up) seems to have taken on in the Fox dialect.

MR GERARD AND THE ROOT "KOMPAU"

THE object of my note in the *American Anthropologist*, N. S., 13, p. 339, was to show that the Natick word in question had cognates in Central Algonquian as well as in Eastern Algonquian dialects. If Mr Gerard had confined himself to citing further cognates in other Algonquian dialects, no reply would be necessary. But the following sufficiently indicates the nature of Mr Gerard's critique:

On the first page we find "the eight or nine linguistic groups into which the Algonquian language is divided." Do the dialects cited constitute his "groups"? The authority for this should have been given. The abstracts of my "Preliminary Report on the Linguistic Classification of Algonquian Tribes" (to appear in the *28th Annual Report of the Bureau of American Ethnology*), which have been printed in *Science* and the *American Anthropologist*, should have been consulted in this connection and a reason for dissenting from the proposed classification should have been given. We further read: "Micmac, a dialect so aberrant as to constitute a group by itself." In the above abstracts I have expressed myself strongly against this view, and Mr Gerard should at least have referred to the abstracts, and preferably the reason or reasons for his objection should have been stated.

Mr Gerard seems to have entirely overlooked the fact that I had come to the same conclusion as he with regard to Baraga's *nin gâbaw*.

Fox *-gāpā-* was not "perhaps inadvertently so written." Surd and sonant are extremely hard to differentiate in Fox, and Dr Jones has honestly recorded his hearing at any given time. For *-gāpāwi-* see below.

The objection to the use of "conjunctive mode" by the claims of priority is somewhat inappropriate. As a matter of fact, from the usage in Fox, Sauk, and Kickapoo, I think "conjunctive" a more suitable term than those mentioned by Mr Gerard. The point that it is liable to confusion with "subjunctive" is really not well taken; the terminations of both modes in Fox so largely coincide that it is as well to designate them by names that suggest each other.

Now, as to "*tcāgänʌgigāpāwātc*^{i} which needs the letters *w* and *i* between *gāpā* and *wātc*^{i} to give it a semblance of meaning, and should be written (in the author's orthography, of course) *tcāg änʌgigāpāwiwātc*^{i}," I am very sorry if it should be, but the fact remains that in Fox it is not so pronounced. The examples cited under *-gāpā-* (*Handbook of American Indian Languages*, pt. 1, pp. 801–802) might have warned Mr Gerard of this. In Kickapoo likewise *-gāpāwi-* does not occur.

Another Fox example (collected by me last summer) is *ā'tcetepigāpāwātc*^{i} 'they were then standing in a circle'. [An example noted by me this summer is *tetepigāpātāw*^{e}, 'let us stand in a circle' (*-tāwe*, Handbook, p. 826).] Note also Fox *ā'pemigāpānil*^{i} 'they were standing in a line', W. Jones, Fox Texts, 224, 13 (*ā—nitc*^{i}, Handbook, pp. 820, 830; *pemi*, p. 768; '*p* for *p* regularly after *ā-*).

On page 542 we read: "and doubtless in Fox and closely related dialects, in which the suffixes of the present indicative must formerly have been *-i*^{a}, *-i*^{a}, and *-iw*^{a}". If that were the case they would appear as such today, for final ^{a}, etc., remain in Fox.

The crowning point is reached in the following: "It may be stated here that the faint vowel sounds (mostly *a* and *i*) in which words belonging to the Fox, Kickapoo, and other dialects of the Osaki-Shawnee group, and to Peoria, Miami, Piankashaw, and other dialects of the Illinois group terminate, have, in many cases, no morphologic value. . . ." Inasmuch as every animate noun and every inanimate noun in the nominative singular respectively end in ^{a} and ^{i} in Fox, Sauk, and Kickapoo; that in these the conjunctive and subjunctive modes are frequently (leaving aside the question of prefixes in the conjunctive) to be distinguished only by the terminal ^{i} and ^{e} respectively (see the table, p. 820, in pt. 1, *Handbook of American Indian Languages*); that the conjunctive and imperative modes in a number of cases are to be distinguished only in the same way (see the table, p. 826; *wī—ātci*, *wī—agi*, *wī—āwātci*, *wī—amowātci* are really future conjunctives, and hence should not have been given even though they have imperative values); that several forms of the participial mode (see table, p. 828) differ from the conjunctive and subjunctive correspondents by the terminal ^{a} only; that certain forms of the potential and prohibitive modes (see table, p. 824) are kept apart only by the terminal ^{e} and ^{i} respectively; that the third person singular of the independent mode distinguishes the animate and inanimate by ^{a} and ^{i} (see table, p. 817); and that ^{i} in Montagnais has a phonetic effect, the extremeness of the statement becomes apparent.

Much the same can be said of Shawnee that has been said concerning Fox, Sauk, and Kickapoo. From the late Dr Gatschet's notes I infer that Miami and Illinois also make these distinctions.

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"WOMEN'S LANGUAGES"

THE literature relating to "women's languages" among primitive peoples, and the theories as to their origin and significance, are pretty well cited and discussed in the section "Frauensprachen" (pp. 7–13) of Dr Richard Lasch's recent monograph on *Separate Languages*.[1] Dr Lasch points out the insufficiency of the older theories, particularly that offered by Bréton in his *Carib Dictionary*, published in 1664, viz., that the existence of a women's language in Dominica was due to the fact of the incorporation by the Caribs of women belonging to foreign tribes, who were saved when the male members were exterminated. These women preserved and handed down from generation to generation of their sex remnants, for example, of the Arawak speech of their ancestors. This view was adopted by Humboldt, Waitz, and others. Some other social *motif* than wife-stealing, or the capture of women, must be looked for at the source of "women's languages". Sapper,[2] in 1897, sought to explain these differences between the speech of men and women as due to the social-economic factor of differentiation of occupation and labor, leading naturally to such diverse appellations of one and the same thing, etc. This view is adopted by Dr Lasch, who points out that the bulk of "women's words, phrases, etc.," as compared with the mass of the language spoken in common by the two sexes, is not so great as some have supposed, relying on the statement of earlier writers concerning the Caribs of the West Indies. Religious and animistic concepts in woman's sphere of thought may also have had some influence here; likewise the play-instinct, which often makes itself felt longer in woman. Taboos of naming also have a rôle in the production of the speech-diversities in question. Lasch mentions, too, the theory of Frazer, who seeks to explain the origin of gender in language by connecting the masculine and the feminine nouns, respectively, with the "men's" or the "women's" languages.

Since Lasch's monograph the most important addition to the literature of the subject is contained in the linguistic material of the Carayan stock published by Dr Fritz Krause[3] in his book on the Araguaya country of Brazil. The Caraya have long been known as one of the Indian people among whom a "woman's language" existed. Ehrenreich,[4] in

[1] *Mitt. d. Anthr. Ges. in Wien*, Bd. 37, 1907.

[2] See *Internat. Archiv für Ethnogr.*, vol. x, 1897, p. 571.

[3] *In den Wildnissen Brasiliens, Bericht und Ergebnisse der Leipziger Araguaya-Expedition 1908*, Leipzig, 1912. See pp. 60, 343–344, 416–457.

[4] See *Zeitschrift für Ethnologie*, vol. XXVI, 1894, pp. 20–24.

his article on the Caraya language, has something to say on the subject and gives a vocabulary. The investigation of this "woman's language" was one of the problems which the author set himself. Dr Krause was successful in obtaining a large number of "women's words" (those given in the vocabulary, with variants, exceed two hundred). Those in the language of the "northern horde" of the Caraya were obtained from men, those in that of the "southern horde" from women, the latter being probably more exact. The men style the "women's language" *ĭbĭnā'lĭ*, i. e., "very bad," and make jests about it. Ehrenreich, who first demonstrated the existence of a "women's language" among the Caraya, found the chief difference in the speech of the two sexes to consist in the insertion, for example, of a *k* wherever in the language of the men two vowels came together. Thus, the men's word for "rain" is *biũ*; the women's, *bikũ*. The initial *k* of the women is dropped by the men. Dr Krause confirms this (pp. 60, 343), and cites the jest of the Caraya Indian Pedro, who said one day that Dr Krause's companion, Francisco Adam, "was a woman", because he pronounced the Brazilian word *jacuba* (a kind of drink), not *šăúbă*, as a man would have done, but *šăkúbă* after the fashion of the women. Ehrenreich thought that the "women's language" of the Caraya represented perhaps an older form of the tribal speech retained by them. Krause, who notes the fact that the women pronounce their words better than the men (p. 60), states also (p. 343) that "probably the women's dialect, with its fuller tone, represents an older form of the language." Of the possible origin of the Carayan "woman's language" he observes (p. 343): "Of a distinct language, arisen, for example, through the reception of female captives from foreign tribes, there is no question here. The taking over of foreign women (Tapirapé, Cayapó, Šavajé) is too limited to have enabled their language to have had any such influence, and, moreover, the deviations from the men's language are too small to make it necessary to look for a foreign derivation of the women's language." The character of the Carayan "women's language" will be seen from the following list of words from the language of the "southern horde":

A. *Words differing but slightly*

English	Men's Language	Women's Language
Head	*ōhŏ'*	*kōhŏ'*
Ear	*nōŏtĭ'*	*nŏhŏdĭ'*
Shoulder	*ăsĭŏtĭ'*	*ăsĭkŏtĭ'*
Star	*dăĭnă'*	*dăkĭnă*

Boy	*ŭālīlī'*	*ŭākīlī'*
Leg-bands	*dēōbŭtă'*	*dĕkōbŭdă'*
Fire	*hāŏtŏ'*	*hākŏ'tĭ*
Raw cotton	*ăsōtă'*	*ăsŏnt'ă'k'*

B. *Words differing considerably*

Neck	*lāhŏ'*	*mādŏ'*
Elbow	*tā(ē)hō'*	*dăkōhŏ'*
Snail-shell	*kūūhŏ'*	*bădāhŏ*
Six	*lēŭljō'*	*lēkălŏ'lă*
Four	*ĭnămbĭŏ'*	*ĭmăkūbĭkŏ'*
Knife (European)	*mā(h)ŭ*	*māk*

Krause includes in his vocabulary of the Caraya "woman's language" some sixty words from Ehrenreich.

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ANTHROPOLOGIC MISCELLANEA

An Important Manuscript Discovery.—A discovery of great importance to early Mexican history and ethnology has recently been made by Mrs Zelia Nuttall by the finding, in the department of manuscripts of the National Library at Madrid, of the *Crónica de la Nueva España* of Francisco Cervantes de Salazar. The manuscript is anonymous, but its author has been identified beyond question by Mrs Nuttall. The volume consists of 885 closely written pages and is bound in a beautiful old cover of red leather with gilt tooling. The manuscript is unfinished and is without an index. It had originally been planned to prepare the work in two parts: at present it consists of six books of unequal length. Book I, which begins with a summary and arguments, consists of 32 chapters; book II has 36 chapters; book III is designated as "of the Second Part" and contains 63 chapters; book IV has 134 chapters; and book V, 198; the unfinished book VI has only 32 completed chapters and the heading of a thirty-third. Of these parts the first and shorter one is devoted to a description of the ancient rites and customs of the Indians, and the longer second part to the discovery and conquest of Mexico. The manuscript has been freely censored, whole chapters having been stricken out (including twenty-four chapters of book IV in which Salazar treats of the first entry of Cortés into the City of Mexico and gives the most detailed descriptions of the temples, palaces, buildings, gardens, etc.), but fortunately without rendering the text illegible except in a few places. A noteworthy feature of the *Crónica* is the many harangues, or rhetorical speeches, that it records as having been delivered by Montezuma, Cuahtemoc, and the caciques of Tlaxcalla, Texcoco, etc.

Salazar was born in Toledo, Spain, about 1514. He was a favorite pupil of the eminent Latin scholar Luis Vives, and became Latin secretary of Cardinal García de Loaysa, great master of the Dominicans, Archbishop of Seville, and Inquisitor General and President of the Council of the Indies. Salazar occupied this post until the death of the Cardinal in 1546. In that year he published his first book, "Works which Francisco Cervantes de Salazar made and Translated," etc., which was dedicated to his friend Cortés. In 1550 Salazar was professor of rhetoric in the University of Alcalá, but he went to Mexico a short time before

the University was founded there and was the first to occupy its chair of rhetoric; he also delivered a discourse at the inauguration of the Latin chair in 1553, in which year he was graduated with several degrees, for he taught and studied at the same time, and took a course under the distinguished Fray Alonzo de Vera Cruz. In 1554 his famous *Diálogos* was published; in 1555 he took holy orders and subsequently acquired the highest degrees in theology. In 1559 Cervantes de Salazar was appointed chronicler of the City of Mexico and commenced to write his *Crónica* of New Spain. In 1562 he made a journey to the mines of Zacatecas, and in the following year became a canon (Herrera says a dean) of the cathedral. He died in 1575.

"That Cervantes de Salazar was held in the highest esteem by the best authorities," writes Mrs Nuttall in a paper presented before the International Congress of Americanists at its recent meeting in London, "is convincingly shown by the fact that the historian Herrera states that, in compiling his Decades, he made use of certain 'Memorias' of Doctor Cervantes, with the remark that he was a diligent and learned man and that he preferred him, as an authority, to Friars Olmos, Sahagun, and Mendieta, who, he says, 'had no authority'." "As to the value of the *Crónica* itself," continues Mrs Nuttall, "there can be no doubt. It must be recognized that no history of the conquest of Mexico was written under such favorable circumstances as those which Cervantes de Salazar enjoyed when he, a learned scholar and a personal friend of Cortés and other conquerors, only 20 years after the conquest began to write his *Crónica* in the City of Mexico, where, as he himself emphasizes, innumerable eye-witnesses of the conquest still lived. . . . In conclusion I must mention what to me seems very remarkable, namely, that Cervantes de Salazar's *Crónica*, book I, contains not only descriptions of some of the Aztec festivals identical with the text of the Magliabechi manuscript, but also descriptions that exactly fit the illustrations to which the texts are missing in the said manuscripts. Moreover, Salazar says, in chapter 28, which deals with the irregular festivals of the Indians, that he will merely refer to some in order to carry out the plan of his chronicle, but that he was 'leaving the rest to be described, with other things worthy of being known, in a separate book'."

It is Mrs Nuttall's intention to publish an English translation of Salazar's work.

Indian Diseases and Mortality.—In a message to the Senate and House of Representatives on August 10, President Taft included the following statement respecting the present condition of health of Indian

reservations and in Indian schools and urged an appropriation of $253,350 for the purpose of enabling the Indian service to make a complete medical and sanitary survey of the whole field:

The death rate in the Indian country is 35 per thousand, as compared with 15 per thousand—the average death rate for the United States as a whole. The average death rate in some of the healthiest of our cities is as low as 12 per thousand. No exact figures are yet available for infant mortality among Indians, but field studies now being made show that while proportionately more Indian babies than white babies are born, very many more Indian babies die.

Last year of over 42,000 Indians examined for disease, over 16 per cent of them had trachoma, a contagious disease of the eye, frequently resulting in blindness, and so easily spread that it threatens both the Indian communities and all their white neighbors. It is a disease so serious that at no port of entry in this country is the immigrant with trachoma allowed to land. On the Kiowa, Comanche, and Apache reservations 71 per cent of the school children have trachoma. The curing of this disease frequently requires years of constant care. Of the 40,000 Indians examined, 6,800 had tuberculosis. On the White Earth reservation in Minnesota, a house-to-house canvass in 1910 and 1911 revealed that of 3,300 Indians, 600 had tuberculosis. An examination of half the Indians on the Blackfeet reservation, Mont., shows that one-third of that number have tuberculosis. Of the total population of the Colorado River reservation, Arizona, 20 per cent have tuberculosis. At the school of the Mescalero reservation in New Mexico, where climatic conditions are ideal, 5 per cent of the children in school have tuberculosis. Of the 7,000 Indians of the Pine Ridge reservation, South Dakota, over one-fourth have tuberculosis. Even in southern California at least 10 per cent of the Indians have this dread disease. In addition to these scourges and the special lowering of vitality which exists in these sections where the Indians can procure intoxicants, they are more subject than the average white man to the whole list of acute diseases. Few Indian homes anywhere have proper sanitary conditions, and in many instances the bad condition of their domestic surroundings is almost beyond belief.

Prof. Warren K. Moorehead, curator of the department of archeology, Phillips Academy, Andover, Mass., reports that the archeological survey of which he has charge finished its first year in Maine September 8. There were with the expedition at various times from eight to twelve men, and nearly all of the Penobscot valley was examined and mapped. A great deal of work was carried on at Passadumkeag, 40 miles above Bangor, and at Lake Alamoosook, 5 miles south of Bucksport. At Passadumkeag one undisturbed cemetery was entirely dug out and at Alamoosook two cemeteries, and at Orland a fourth was found. In these four cemeteries were 170 graves, from which about 800 stone objects were recovered. These graves contained large quantities of red

ochre—not the small particles often encountered in exploration in the West and South, but quarts, and in several instances more than a peck. The objects found in the graves vary from one or two to nineteen in number, and comprise the true gouge, various modified forms of gouges, and stone celts and hatchets, usually squared. There were also some unknown forms of stone objects, particularly at Passadumkeag, where long oval stones were found; these are perforated, and several exceed a foot in length. The absence of grooved axes, of pottery, and bone and shell objects, of pipes, etc., indicates the presence of a culture different from that of the Algonquian tribes as generally known. Save in one instance, no human bones were discovered, and the graves are so old that even some of the stone objects have commenced to disintegrate. Mr Charles C. Willoughby, twenty years ago, opened three burial places in southern Maine and met with similar conditions. Professor Putnam and Mr Willoughby considered the graves extremely old. The name "the red paint people" has been applied tentatively to this culture.

Prehistoric Implements near Halifax, England.—In the twelfth bulletin of the Bankfield Museum, Halifax, England, Messrs H. P. Kendall and H. Ling Roth, the honorary curator, publish a catalogue of an interesting exhibition, now open, of prehistoric implements collected in the neighborhood of that city. They were found under a layer of peat, associated with remains of the Bronze age. But the implements of that metal hitherto brought to light are small and fragmentary, and it is thus obvious that the age of stone overlapped that of bronze. The period assigned to these specimens is about 500 B. C. Some of the arrowheads are fine examples of secondary chipping. Of special interest are the so-called "pygmy" flints, found in considerable numbers. Mr Ling Roth dismisses the theory that these were fixed together in a handle and used like the implement found by Dr Livingstone among the Makalolo for the destruction of the inner tissue of hides. While admitting that some of them may have been used for the purpose of tattooing, he urges that their great numbers show that this can not have been their only object. Many uses may be conjectured for these curious implements, but no single explanation yet suggested accounts for their special forms.— *Nature.*

Excavations at Carchemish.—This season's excavations at Carchemish, which, according to *Nature*, have been carried out by Messrs C. L. Wooley and T. E. Laurence under Mr Hogarth's direction, have resulted in some important additions to our knowledge of Hittite art and

culture. Riverside quays have been discovered below the Citadel mound, decorated with reliefs in the style of the Cappadocian monuments, and a further series of interesting reliefs have been found along the southern wall of the great courtyard in front of the Lower Palace. On one of these the camel makes its first appearance in Hittite art, and another shows a strange deity having the body of a scorpion, eagle's wings, and bull's feet, who is associated with the Hittite Thunder god. The most interesting of the smaller finds was a part of a large clay cylinder inscribed with Hittite hieroglyphs, and it suggests the possibility of finding further native records, other than monumental inscriptions, on the site. Materials for a valuable pottery-sequence have also been obtained both at Carchemish itself and from a cemetery at Amarna, about eight miles to the south of Jerablus.

Lefthandedness among Papuans.—In his interesting reminiscential volume, *An Outpost in Papua* (London, 1911), Rev. A. K. Chignell has the following rather significant passage (p. 118):

"We have one or two dunces: Garita, who comes from Murin, and is less than half-witted; and Embaki, who somehow escaped school-going until his fingers were too big and stiff to hold around a pencil; and Basira, who always sleeps peacefully in his corner most of school-time, and a few others.

"I have noticed no tendency to lefthandedness among the two or three hundred children I have watched in this school, except in the case of these mentally deficient youths, who are all, it seems, lefthanded. And there is Suka, the cripple boy, who walks on his knee-caps with his feet stuck up in the air behind him, like a big mosquito. Suka is not merely lefthanded, but he tries to write backwards, as Hebrew is written, and, if he has to copy anything from the blackboard, he actually manages to get everything upside down as well. I have never understood how he can do it, unless there is an arrangement of lenses and looking-glasses inside his misshapen head, which makes him see the whole world upside down and inside out."

The occurrence of lefthandedness with "mirror-script," etc., in a young Papuan is perhaps deserving of notice here.

ALEXANDER F. CHAMBERLAIN

Rock Carvings in France.—Dr G. Lalanne, under the title "Bas-reliefs à figuration humaine de l'abri sous roche de Laussel (Dordogne)," describes, in *L'Anthropologie* for March–April, two remarkable rock carvings, one of a male, the other of a female. The block on which the

female carving appears now lies outside the excavation. It represents a woman in profile, holding the horn of a wild ox in her hand, but nothing remains to indicate the expression or the mode of arrangement of the hair. It is apparently of the Paleolithic type which has already been discovered at Brassempouy in the Landes, Menton, and Willendorf in Austria. These discoveries appear to indicate that in the Aurignacian period central Europe, and possibly the Mediterranean area, were occupied by a negroid race, characterized in the female by well-marked steatopygy, such as that which appears among the modern Bushmen. The male image, on the other hand, displays a delicacy of form which is in direct contrast to that of the female.

Early Man in Switzerland.—A summary of the results of recent investigations with regard to the former presence of an "Allemannienne" race in Switzerland is contained in the second volume of the 94th Jahresversammlung of the *Verhandlungen der Schweiz Naturfor. Gesellschaft.* Examination of a series of prehistoric skulls and skeletons indicates that the ancient Allemanniennes and modern inhabitants of northern Switzerland belong to two widely sundered types, the former being related to the population of Franconia, Moravia, and northwest Germany from the ninth to the fourteenth century. These people were a blond-haired race resembling in physical characters the modern Swedes. This indicates that while great modifications have taken place since prehistoric times in the population of northern Switzerland and southern Germany, that of Sweden has remained practically in its original primitive condition, so far as the physical type is concerned.—*Nature.*

IN *The Museums' Journal* for June, Dr F. A. Bather describes an open-air folk museum recently established by the local schoolmaster of Bunge, a thinly inhabited parish in the north of the Baltic island of Gotland. Part of the meadow occupied by the museum contains a seventeenth-century farm-house, which forms the nucleus of the collection. In the farm-yard various primitive agricultural implements are exhibited, and in the adjacent smaller buildings representations of local industries, now passing away, are shown. One peculiar feature of the museum is a patch of ground containing models of various forms of burial practised in the neighborhood from the first century B. C. to the fourth or fifth century A. D., including a model of a stone monument in the shape of a Viking ship. Close by is a judgment circle of eight large stones, and in another part of the ground is a thingstead, a circle of small stones with a mound for the speaker.

EXAMPLES of the transition between the use of stone or bone implements and those of metal are always interesting. In the *Cairo Scientific Journal* for June, Mr O. Bates describes two cases of this kind. In one the narrow chisel-shaped celts so often found in Neolithic kitchen-middens and camp sites are compared with a tool made of the horn of the *Gazella rufifrons*, which is rubbed down to a flat edge and used at the present day in the Sudan for slivering bark from trees for the purpose of making cordage. The second is an implement used in the same region for cutting coarse thatching grass. It consists of a haft of mimosa wood into which is socketed a celtiform blade of iron, which is fixed at an angle of about 20 degrees to that of the hafting, so that when the tool is grasped by a worker who bends from the hips, the iron is parallel with the ground. This tool preserves a characteristic form, which must have preceded the introduction of the curved reaping-hook, and illustrates a method of hafting probably used with some of the flat, broad-edged stone celts of Neolithic times.

NEWS reached Copenhagen early in May, as we learn from the *Geographical Journal*, of the arrival at Maskat of Mr Barclay Raunkiær, a Danish traveler, who set out for that country in November, 1911, under the auspices of the Royal Danish Geographical Society. The explorer traveled from Aleppo via Baghdad to Basra, which he reached on January 22. From Koweit (where he was well received by the regent) his intention was to go south to Riad in the Wahabi country, and thence to make his way back to the Persian gulf by an eastward route through the Hofuf oasis. According to the preliminary announcement he appears to have successfully carried out this program, and to have secured valuable anthropological, zoological, and botanical observations, besides mapping the country traversed. Mr Raunkiær is known as a writer on the geography of plants, and for a previous journey made by him in central Tunis.

THE June number of *The American Museum Journal* states that Mr William Floyd, of Long Island, while looking for archeological remains on his estate, uncovered an Indian burial, the skeletons from which he has presented to the Museum. The grave contained three skeletons, one apparently that of a girl, the others of two middle-aged men. As is the case with most burials in this vicinity, no objects of any kind were found in the graves. Mr Max Schrabisch of Paterson, New Jersey, reports having found a very important rock shelter near Stony Point, New York. The excavations of this shelter had been rewarded with rich finds of pitted hammer-stones, knives, scrapers, and pottery.

ANDREW LANG died of heart failure at Banchory, Scotland, on July 21, aged sixty-eight years. In the field of anthropology Lang was best known by "The Book of Dreams and Ghosts," "The Secret of the Totem," "Custom and Myth," "Myth, Ritual and Religion," and "The Making of Religion." Altogether his writings are legion and of a remarkably wide range. A critique by Lang on the subject of totemism appeared in the last number of this journal. A more extended notice of his life and work will appear in our next issue.

THE late Professor Lombroso offered every second year in connection with the *Archiv d'Antropologia Criminale* a prize of 500 francs for the best work in connection with criminal anthropology. His family have now offered to the organization committee of the Eighth International Congress of Criminal Anthropology a prize of 1,000 francs for the best work reported to the congress which is to be held in Budapest in the summer of 1914.

THE committee on Indian Affairs of the House of Representatives has favorably reported a bill repealing the law that permitted the destruction of the old Wyandot burial ground in Kansas City, Kansas, which was desired for commercial purposes by business interests. Scores of survivors of the Wyandot tribe petitioned that the graves of their ancestors be left undisturbed. The bill has been passed by the Senate.

THE annual meeting of the American Anthropological Association will be held in Cleveland, Ohio, beginning December 30, 1912, in affiliation with Section H of the American Association for the Advancement of Science and the American Folk-Lore Society.

IN THE *Journal of Anatomy and Physiology* (XLVI, part III) Dr Duckworth describes an Ashanti skull with defective dentition. It is that of a young adult in which the upper incisor teeth have been removed, evidently in early childhood. This kind of mutilation is characteristically East African, and is met with in crania from rock-hewn tombs in Abyssinia of the fifth century A. D.

PROF. FREDERICK STARR, of the University of Chicago, sailed on June 20 for Africa on an expedition for anthropological research. After a visit to Morocco and the Canary islands, Professor Starr and his party will go directly to Liberia, and thence into the back country, where they will spend the rest of the year, returning about January 1, 1913.

BY resolution of Congress, the "Handbook of American Indians North of Mexico," published as *Bulletin 30* of the Bureau of American

Ethnology, has been ordered reprinted in an edition of 6500 copies, of which 4000 copies are for distribution by Representatives, 2000 by Senators, and 500 by the Bureau.

MR SAVAGE LANDOR, the well-known explorer, has returned to London, after a journey of eighteen months across South America, largely through that portion of the continent which is still little known to Europeans and Americans. In recognition of his achievement the Brazilian Congress has voted him the sum of $20,000.

ON June 26, King George V laid the corner-stone of the new National Museum of Wales at Cardiff. All sides of Welsh life and activities were represented, and members of home and foreign museums were present. The museum is to be in the form of a rectangle, 440 by 250 feet, enclosing a quadrangle of 307 by 134 feet.

THE annual exhibition of antiquities discovered during the third season of excavation at Meroë, Sudan, carried on in connection with the Institute of Archeology, University of Liverpool, was held in the rooms of the Society of Antiquaries, Burlington House, London, W., July 9–23, inclusive.

STUDENTS of the Indians of Virginia will be glad to learn of the publication, by the Virginia State Library at Richmond, of *A Complete Index to Stith's History of Virginia*, by Morgan Poitiaux Robinson (Richmond, 1912).

DR W J MCGEE died at Washington on September 5th, aged fifty-nine years. An extended notice of Dr McGee's life and work will appear in our next number.

THE SMITHSONIAN INSTITUTION will send without cost to any student requesting them, copies of the lithographic plates illustrating Swan's "Haidah Indians of Queen Charlotte Islands" published in volume XXI of *Smithsonian Contributions to Knowledge*, Washington, 1874.

MM. SITTONI and Podenzana have founded at Spezia a new review devoted exclusively to the past history, present condition, and future fortunes of old Liguria. It is entitled *Archivo per la etnografia e la psicologia della Lunigiana*, and the first number appeared in 1911.

NATURE for August 1 contains an article on the Pygmies of New Guinea, whose existence has only recently been put beyond doubt, summarizing some of the more important results of the investigations of Williamson and Wollaston.

MR HARLAN I. SMITH, representing anthropology, has been elected a member of the executive committee of the staff of the Canadian National Museum, whose new home, the Victoria Memorial Museum building at Ottawa, has been completed.

ON February 3, an ethnographical museum was opened at Cherbourg, France, due to the labors of Dr René Collignon. Museums of ceramics, numismatics, and natural history have been founded in this place by the same scholar.

MR A. M. HOCART has been appointed to a senior studentship at Exeter College, Oxford, tenable for two years, in order that he may undertake anthropological research in Fiji and its immediate neighborhood.

THE Berlin Society on Racial Hygiene has offered a prize for the best discussion of the following question proposed by Dr Hallwachs: "Is not material and social progress a danger to the health of the race?"

DR GEORGE A. DORSEY, associate professor of anthropology in the University of Chicago and curator of anthropology in the Field Museum of Natural History, has returned from a three years' tour of the world.

THE First International Eugenics Congress is reported to have been a complete success. The membership of the Eugenics Society, 750, shows what widespread interest is taken in this practically new science.

MUCH interest has been aroused by the discovery of a human skeleton of modern type, alleged to have been taken from mid-glacial sands near Ipswich, England.

AN important discovery of worked flints has been made by H. Commont in the clays of Sainte-Walburge at Liège, on the highest point of the Hesbays plateau, 140 meters above the surface of the Meuse.

DR FEDERICO OLORIZ Y AGUILERA, one of the most noted anthropologists of Spain and organizer of the anthropometrical service of the Department of Justice, died at Madrid, February 27, 1912.

DR TRUMAN MICHELSON, of the Bureau of American Ethnology, Washington, has resumed his field researches among the Algonquian Indians and is now among the Foxes of Iowa.

DR A. TRÉMEAU DE ROCHEBRUNE, author of works on botany, comparative anatomy, anthropology, and ethnography, died April 23 in his 80th year.

DR HERBERT MÜLLER, of the Anthropological Museum in Berlin, has gone to China for ethnological researches in Manchuria and easterr Mongolia.

A MONUMENT to Prof. E. T. Hamy, the work of the eminent sculptor Fagel, has been erected at Boulogne-sur-Mer, and was unveiled June 30.

THE Third International Archeological Congress will be held at Rome, Oct. 9–16, 1912.

M. ÉMILE CARTAILHAC has been promoted to the grade of Officier of the Legion of Honor.

M. GUSTAVE CHARIVET has been nominated to the rank of Chevalier of the Legion of Honor.

JULES HÉBERT, of the Musée d'Ethnographie du Trocadero, died March, 9, 1912, aged 58.

THE Fourth International Congress of Religions was held at Leyden, Sept. 9–13, 1912.